Essays on corporate finance and corporate taxation

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Essays in Corporate Finance and Corporate Taxation

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Introduction

This PhD thesis contributes to answering the question: How do taxes affect corporate financial decisions? I provide empirical evidence to answer this question. In my job market paper I investigate how uncertainty about the interpretation of tax law affects leverage decisions. In my second paper I investigate the effects of foreign and domestic tax rates on the leverage decision. In the last paper we investigate how tax avoidance behavior affects labour allocation.

In the first chapter, **As Uncertain as Taxes**, I ask the question: Does uncertainty about the interpretation of the tax law affect corporate financial decisions? To be widely applicable, tax law has to leave room for interpretation, which creates 'legal uncertainty'. Companies can use this 'legal uncertainty' for tax planning, or use debt as a relatively certain tax planning tool. I construct a measure of 'legal uncertainty' and show that this uncertainty leads to a substitution between debt-based and other tax planning strategies. I find that both financing and subsidiary location decisions are affected. The strength and direction of this effect depends on the intensity of the enforcement by the tax authority.

In the second chapter, **Debt and Taxes: The Role of Corporate Group Structures**, I ask the question: Do multinational companies use corporate financial policy to benefit from differences in tax rates across countries? I introduce the 'global income effect', which shows that the effect of corporate income tax rate changes on leverage depends on the corporate group structure. So far the literature has identified two effects of tax rates on financial leverage. One is the 'local income effect', which is the trade-off theory effect, the other is the 'substitution effect', predicting that multinationals shift debt to the country where it yields the highest tax benefit. Ignoring the 'global income effect' can lead to an significant underestimation of the effect of tax rates on the level of leverage of multinational companies, as well as a substantial mis-estimation of the allocation of that leverage across the firms in the multinational's corporate group.

Finally in the third chapter, **Labor Effects of Tax Avoidance**, we ask the question: Do companies shift their production factors as a result of tax avoidance opportunities? By exploiting a regulatory shock that differentially affected parent-subsidiary pairs across countries, we find that firms increase their labor input in treated subsidiaries. We document no such effect for capital expenditures and we find no evidence of parent companies nor the affiliated subsidiaries decreasing their employment as a result of the event, suggesting that there was no substitution within the multinationals. As a result of an exogenous shock to tax avoidance opportunities, our results imply that the affected multinationals grew as whole.

Contents

Chapter 1

As Uncertain as Taxes

1.1 Introduction

"in this world nothing can be said to be certain, except death and taxes."

Benjamin Franklin, in a letter to Jean-Baptiste Leroy 1789

Franklin was right: corporations will always face some tax obligations over their lifetime. However, the extent of those obligations is not nearly as clear. Companies face tax laws which are complex and cannot cover all possible actions of the company. This creates room for interpretation of the law, which can lead to disputes about the correct interpretation. In the legal literature this incompleteness of the law is referred to as legal uncertainty Pistor and Xu (2002, 2003); Givati (2009); Dari-Mattiacci and Deffains (2007). Companies can use this legal uncertainty in their tax planning strategy, or choose a more conservative tax planning strategy to avoid the legal uncertainty.

It can be profitable for firms to use corporate policies to reduce their tax bill (tax planning). For instance the corporate inversions of the 1990s, which allowed multinational companies to avoid US taxes on foreign profits, saved companies billions (New York State Bar Association, 2002). This is not an isolated example, as total world-wide corporate tax planning benefits are estimated at over 500 billion dollars a year (Cobham and Janský, 2017), suggesting that benefits can be substantial. However, recent cases like the European Commission forcing Apple to pay 13 billion of Irish taxes suggests that the risks are substantial too (European Committee, 2016).

In this paper I investigate how legal uncertainty affects capital structure through its effect on tax planning opportunities. Theory suggests that an increase in non-debt tax planning opportunities can decrease the use of debt-tax shields (DeAngelo and Masulis, 1980; Graham and Tucker, 2006). Legal uncertainty increases the amount of tax planning opportunities available to the company, thereby affecting the use of debt tax shields. I show that this is indeed the case and that as a result, legal uncertainty significantly affects financing and profit shifting decisions.

Law can be seen as an incomplete contract (Hart and Moore, 1988) between the government and the companies in the country. The law cannot cover all possible corporate actions and must therefore leave room for interpretation to ensure it can be widely applied. While, courts ultimately decide which interpretations of the law

are acceptable and which ones are not, companies can use the room for interpretation to interpret the law favorably. As a result, legal uncertainty reduces the expected mean tax rate, directionally similar to the effect of leverage. Contrary to the use of leverage, the use of legal uncertainty can vary in complexity, risk, and cost of executing the tax planning strategy, but does not carry bankruptcy costs.

Despite its practical relevance, legal uncertainty in tax law has not been widely investigated (Zangari, Caiumi and Hemmelgarn, 2017). To the best of my knowledge, this is the first paper empirically looking at the effects of this legal uncertainty on capital structure and tax planning decisions.

The law literature has highlighted the importance of legal uncertainty (Givati, 2009; Pistor and Xu, 2002, 2003). However, due to the lack of an accurate measure for legal uncertainty, it has been challenging to empirically investigate its effect on corporate decisions. I construct such a measure, which allows me to give substance to the notion of legal uncertainty and estimate its effect on corporate decisions.

I construct a measure for legal uncertainty based on the legal literature about complexity and legal uncertainty (Pistor and Xu, 2002, 2003; Kaplow, 1995, 1999; Dari-Mattiacci and Deffains, 2007). Based on the legal insights from these authors, I classify law articles as either limitative or suggestive. Limitative articles provide clearly defined rules, while suggestive articles set forth broadly applicable, but vague general principles. Especially these suggestive articles contribute to the incompleteness of the law, which creates the legal uncertainty. I construct a dataset mapping this structure of the tax law for ten countries over seven years, by separately classifying every article in the (corporate) income tax law for each country and year.

In addition to this legislative component I also take into account outcomes of previous court cases. Previous court cases provide information on how courts will interpret the law in future cases, resolving some of the legal uncertainty. I collect the total number of court cases ruled on by the highest court in each country and combine this judicial component with the legislative component to construct my measure for legal uncertainty. I find that a one standard deviation increase in legal uncertainty is associated with a 1.3 percentage point decrease in leverage and I find evidence that multinational groups shift income from high-tax countries towards low-tax countries, increasing the tax base of profitable low-taxed group members by 20% on average, when the legal uncertainty of high tax group members increases by a standard deviation. These results suggest that legal uncertainty has a significant real economic impact, meaningfully affecting financing and subsidiary location decisions of companies.

Becker (1968); Polinsky and Shavell (1979), and Calfee and Craswell (1984) show that when legal uncertainty is introduced in a model on optimal tax auditing and sanctions companies will either under- or over-comply with the law. This suggests that my analysis should take into account the institutional framework in which companies operate. To capture this effect I construct a proxy for the audit probability and investigate how it interacts with legal uncertainty. The proxy is based on the percentage of companies audited in the prior year. I indeed find that when the probability of being audited by the tax authority is high the effect of legal uncertainty is reversed. This shows that the use of legal uncertainty is indeed a risky action, an increase in risk decreases its use.

The proxies for legal uncertainty and the audit probability capture the roles of all three branches of government in creating, alleviating, and augmenting the effects of legal uncertainty. The executive branch enforces the law and has a strong impact on how companies respond to legal uncertainty, while the judicial branch can alleviate legal uncertainty with its rulings. Considering the sizable impact of legal uncertainty on companies the legislative branch should take into account whether the institutions of the country are equipped to efficiently enforce and interpret new legislation. Moreover, they need to ensure that these institutions and legal uncertainty do not interfere with the goals of new legislation.

To extend the analysis and to ensure robustness I perform several additional tests. I use a shock to legal uncertainty, caused by a ruling from the European Court of Justice (2006), to show that companies do indeed substitute between debt-based and other tax planning strategies. The shock led to a change to anti-tax-avoidance rules in some European countries, but not in others. Before the change, (part of the) profits from a subsidiary located in a country with a low corporate tax rate would face an additional tax in the parent country. After the shock, the application of the additional tax was no longer certain, as it had to be evaluated on a case-by-case basis. If the subsidiary served an economic purpose beyond tax planning the profits could not be additionally taxed, making it more beneficial to have a subsidiary in EU countries with a low corporate tax rate. If the subsidiary mostly served a tax avoidance purpose the additional tax would be imposed. When a subsidiary is deemed to serve a tax avoidance or economic purpose is not clearly defined, this is what increased legal uncertainty. I compare the leverage of parent companies of low-taxed subsidiaries from affected countries (treated), to the leverage of parent companies of low-taxed subsidiaries from non-affected countries (control). The results from the main regressions are confirmed.

Furthermore, I ensure that companies with the most to gain from tax planning do indeed see the biggest increase in tax planning. Similarly, those companies which likely cannot benefit from using both debt-based and other tax planning strategies at the same time show stronger substitution. To ensure the effect of the shock is due to an increase in legal uncertainty I compare companies with different types of ownership. Companies with non-diversified owners are less likely to take risks (Faccio et al., 2011) and therefore react less to the shock. Furthermore, I ensure that the effects are not driven by changes to legislation specifically targeting debt based tax planning (Panier et al., 2012; Buettner et al., 2012), by excluding companies from countries that introduced such rules. A different concern could be that companies lobby for more legal uncertainty. Based on insights from Hill et al. (2013); Neretina (2018) I exclude companies most prone to lobbying. Lastly, I make sure that endogeneous incorporation of new subsidiaries does not drive the effect on leverage or income shifting.

This paper contributes to the several strands of literature. First, the literature on taxes and capital structure has focused on the effects of tax rate changes (Graham, 2000; Heider and Ljungqvist, 2015; Huizinga et al., 2008) and the introduction of rules specifically targeting the use of debt for tax planning (Panier et al., 2012; Buettner et al., 2012). Recent papers have investigated the benefits multinationals can obtain (Huizinga et al., 2008; Brok, 2018) by using differences in tax codes across

countries. Graham and Tucker (2006) show for a sample of 44 companies punished for tax-sheltering that these tax-sheltering companies have lower average debt than comparable companies. In line with this paper, I show that the capital structure is not just affected by factors that affect the benefit of debt-based tax planning, but also by the factors affecting other tax planning strategies. My contribution compared to Graham and Tucker (2006) is that I show that legal uncertainty is an important determinant of this substitution between tax planning strategies. Not only does this increase our understanding of this substitution, but it also shows how legal uncertainty affects corporate decisions and provides relevant policy implications.

Secondly, the literature on uncertainty in law has focused on the future of legislation and how it affects optimal corporate decisions (Baker et al., 2016; Gulen and Ion, 2016). I argue that even when we know what the law will look like in the future, today's legal uncertainty still affects corporate decisions through its effect on tax planning strategies. This effect is not just different in its timing, but also in its nature. Companies can use legal uncertainty to their advantage and it is therefore not necessarily something they want to avoid. The legal literature has extensively debated legal uncertainty and its importance (Givati, 2009; Pistor and Xu, 2002; d'Amato, 1983). My main contribution to this literature is that by creating my proxy for legal uncertainty I can actually estimate the effect and show its economic importance.

Thirdly, the literature on base erosion and profit shifting (Gumpert, Hines Jr and Schnitzer, 2016; Tørsløv, Wier and Zucman, 2018; Dharmapala, 2014; Cristea and Nguyen, 2016; Desai, Foley and Hines, 2006; Ruf and Weichenrieder, 2013; Weichenrieder, 1996; Dharmapala and Riedel, 2013; Shevlin, Lampenius and Stenzel, 2019). I add to this literature by investigating a determinant of profit shifting, thereby increasing our understanding of what allows companies to erode their tax base.

Lastly, I also contribute to the literature on the determinants of capital structure (Rajan and Zingales, 1995). While the importance of taxes for capital structure has been known since Modigliani and Miller (1963) and Kraus and Litzenberger (1973), research on the impact of non-debt based tax planning strategies has only recently started to gain traction (Desai and Dharmapala, 2009; Graham et al., 2014; Dyreng et al., 2008, 2010). This paper shows the importance of further investigating the determinants of tax planning and its effects on capital structure and other corporate financial decisions.

The structure of this paper is as follows: I describe the institutions involved in the tax process in Section 1.2.1. Section 1.2.2 discusses measurement of the relevant parameters. I formalize my hypotheses in section 1.2.3. Section 2.4 describes the estimation strategy. Section 2.3 describes the data. Section 2.5 presents the results and Section 1.6 shows the results for the shock. In Section 2.6 robustness tests are presented. Section 3.7 concludes.

1.2 Framework

1.2.1 Institutional framework

In this section I describe how the taxation process works and which institutions are involved in this process. Details differ from country to country, but the general concept is similar.

The legislative branch writes tax laws. A law will set forth the tax rate and how to calculate the profit for tax purposes (the taxable base). The law cannot cover all possible contingencies that occur in everyday business and it can be thought of as an incomplete contract as described in Hart and Moore (1988). This incompleteness can give rise to legal uncertainty.

An increase in legal uncertainty means that there are more situations in which it is not certain what the legal results of an action will be (Pistor and Xu, 2002, 2003; d'Amato, 1983), or in other words, an increase in the incompleteness of the law.

Companies file a tax return each year, but as a result of the incompleteness of law it can be ex-ante unclear what the tax treatment of some actions taken during the year will be. Moreover, companies can structure their actions in a way that will influence the tax treatment ('tax planning'). For instance, a company sets up a foreign subsidiary in a low tax country, which sells the right to use intellectual property to the rest of the company. This results in a tax deductible cost for the parent company and a lower-taxed revenue for the new subsidiary. Such structuring must occur before the actual moment of taxation.[1]

The tax authority (executive branch) verifies the company's tax filing and collects the taxes. Due to the large amount of tax filings they can only audit a fraction of the companies that file each year. A company does not ex-ante know whether it will be audited. If an audit shows that a tax planning strategy was not adhering to the law, fines can be charged. In most countries fines are only imposed when a strategy is 'not defensible'. Defensibility suggests a strategy uses an interpretation of the law which is ex-ante reasonable, based on the law and previous court cases. Tax authorities or a court ex-post disagreeing with the strategy does not necessarily imply it was ex-ante unreasonable.

The parties can go to court (judicial branch) when they disagree about audit outcomes. After a court ruling the tax is collected or returned and in most countries interest is added. Parties can appeal the ruling at a higher court. Both the lowest and the appeal courts deal with the interpretation of the facts and how to apply the law to these facts. For instance, when evaluating in which country a company has to pay tax, the court establishes where the company is incorporated and where the company's management is or where it performs its main activities (facts). Next it rules on how the law should be interpreted and applied to these facts (interpretation).

Even if the tax planning strategy of a company follows the 'letter of the law' the court can rule that an action lacks economic substance and serves only a tax avoidance purpose, thereby violating the 'spirit of the law'. This would result in

[1]Tax planning is not necessarily seen as something negative in this paper. In many cases tax planning is both within the spirit and letter of the law. However, Desai and Dharmapala (2009) show that some tax planning investments are not value enhancing.

the company losing the case, even though it technically complied with the law as written. A famous example are so called letterbox companies. A company legally incorporates in a low tax country, but its main activity in that country is the use of a letterbox in that country. This raises the question: when is a company located in a country? What matters, being legally incorporated (letter of the law[2]) or having substantial economic activities in the country (spirit of the law)?[3]

As a last resort in conflicts, parties can appeal at the highest court of the country. Generally, the highest court can only rule on the interpretation of the law and not on the interpretation of the facts of a case. For instance, the court can rule on whether economic substance requires a foreign subsidiary to have local management, but does not investigate who was in fact managing the subsidiary. Such a court is typically referred to as a court of cassation. It will rule on the interpretation of the law, which will be applied by the lower court in this case and to future cases with a similar setting. So even in civil law countries case law carries significant weight.

Note that the legal literature distinguishes three types of so called non-compliant actions. Tax evasion, which is an-after-the fact action in which a company hides (part of) the information relevant to determine the tax base. Tax planning, which is the before-the-fact structuring of actions to minimize taxes paid within the limits of the law. Tax avoidance, which is tax planning which has been ruled to violate the spirit of the law, or lacks economic substance (Öner, 2018). So any defensible use of the law is a tax planning strategy until the legal uncertainty about the strategy is resolved. Once resolved it will become tax avoidance if ruled unfavorably, or remain tax planning if ruled favorably. Since I look at the effect of legal uncertainty, I will refer to the strategies of the company as tax planning strategies throughout this paper. The company is uncertain about whether its strategy is a tax avoidance or a tax planning strategy. Tax evasion is ignored in this paper as tax evasion deals with a company which specifically hides relevant information from authorities. This makes it impossible to detect without performing an audit, a luxury that is not afforded to the econometrician. Due to the possibility of jail sentences and high fines the incentive structure of tax evasion is different from that of tax planning.

1.2.2 Measurement of legal uncertainty

Construction of the measure

Legal uncertainty is inherent in law. A law cannot cover all contingencies and actions of companies. Therefore, it has to leave room for interpretation (Hart and Moore, 1988). This room for interpretation is later limited by rulings of courts, which clarify how the law should be interpreted. This is why my measure captures the room for interpretation of the law, with a legislative component, and the clarification by courts, with a judicial component.

For the legislative component I look at the structure of the law (Pistor and Xu,

[2]Most countries by now have updated their laws to move away from this being the legal definition.

[3]Countering tax planning which uses letterbox companies has proven difficult in reality (Cremers, 2017). Several countries have already included economic activity as part of the letter of the law. However, the meaning of economic activity is still uncertain in many cases.

2002, 2003; Dari-Mattiacci and Deffains, 2007). The literature on the structure of law suggests that law articles can be classified as suggestive or limitative.

Suggestive articles tend to be more dynamic and broadly usable, but lack a clear definition. These articles most represent the incomplete contracts as in Hart and Moore (1988) and create legal uncertainty as a result of using undefined general principles. On the other hand, limitative articles state clearly defined rules, creating little legal uncertainty.

An example of a limitative article is Article 22 of the Dutch corporate tax code (Wet op de Vennootschapsbelasting 1969, 2005)[4] states: *The tax due is 31.5% of the taxable base, or the Dutch taxable base, with the caveat that the tax due is 27% on the first 22 689 euros.*

Since the taxable base is defined in the rest of the law, this article is limitative. It defines the clear rule of what the tax rate is. The articles defining how to calculate the taxable base are all individually analyzed and classified as suggestive where necessary. For instance article 3.20 of the Dutch income tax code (Wet op de inkomstenbelasting 2001, 2005) defines profit as: *The profit attributable to a year has to be determined according to good merchant practice, with a consistent application which is independent of the expected outcome. The consistent application can only be changed if good merchant practice justifies it.*

In Appendix 1.10 I discuss when an article will be classified as limitative or suggestive.

The above example of a suggestive article highlights the importance of the judicial component of my measure. Years of court cases have taught us how to interpret 'good merchant practice'. Without these court rulings it is unclear what 'good merchant practice' means. Companies can use rulings by the courts as an indicator for how courts will rule in future cases, thereby reducing uncertainty. I use rulings made by the highest courts, which will be used by lower courts to interpret the law in future court cases. Both the tax authority and the company can call on this 'case law' as a justification for their interpretation of the law. A suggestive rule which has been discussed in case law is not as uncertain as one without any case law.

I limit the case law to the cases from the courts of cassation of each country. These courts only rule on the interpretation of the law. The rulings therefore provide clarification of the law and will on average reduce 'legal uncertainty'. By only using cases from the courts of cassation I also ensure that my measure does not capture the general propensity to litigate in a country, or the efficiency of the court in ruling on many cases.

I define legal uncertainty by combining the legislative and judicial component. The legislative component is the ratio of suggestive articles to total articles in a given country and year. The judicial component is the summed amount of case law rulings in a country from the start of my sample up to the end of the year. There are hundreds of case law rulings each year. To ensure this part of the measure does not completely overpower the suggestiveness ratio (which is defined on the [0,1] interval) I scale the judicial component by its mean across countries and years. The

[4]Dutch laws are referred to by the year they became active. Subsequent changes to the law don't change this designation. Hence the corporate income tax law is called Corporate Income Tax Law 1969. The version I am citing from here is the text as last updated on 1-1-2005.

more suggestive articles there are in the law, the more uncertain the law is and the higher my measure for legal uncertainty is. Similarly, case law rulings decrease legal uncertainty and therefore I subtract this component. Section 1.4.2 describes the quantitative details of the legal uncertainty measure.

(1.1)

Where c indicates the country and t the year. Their capitalized versions indicate the total number of countries and years respectively.

The countries used in this paper are Austria, Belgium, Czech Republic, Germany, France, Finland, Poland, Netherlands, Spain and Sweden. Country selection depends on availability of legal texts and information on court cases. The sample is further restricted by language constraints, since most documentation is only available in the original language.

Information about the structure of the law is obtained by reading the laws of the countries involved. This means that for each country in the sample I obtain the tax law as it existed in 2005. The relevant tax laws are the corporate tax code and where necessary the general income tax code. Original law texts from 15 years ago are not easily obtained. In cases where the 2005 law text is not available, I start from the 2017 text. I then backwards engineer the changes to the law by going through the bills that passed parliament and contain changes to the tax code. I verify that I capture all changes by looking at the complete text of the tax law in earlier years, when available.

When a suggestive article refers to other laws I ensure that these other laws do not give a limitative explanation of the article. Similarly, I track down decrees issued by the government when these are explicitly mentioned in the law and verify that these don't clarify suggestive phrasing.

Law texts were obtained from the International Bureau for Fiscal Documentation (IBFD) in Amsterdam or directly downloaded from government websites. For several countries the law texts are only available in hard-copy and/or the original language. Furthermore, many articles have explicit exceptions, refer to other articles, or only work on request. Therefore, the use of automated textual analysis programs will lead to data inaccuracies. Instead, every article is read and the set of rules, as described in Appendix 1.10, is applied to classify the articles as suggestive or limitative. After completing this for each country, all laws are re-read to ensure consistent application of the classification rules across countries.

Information on the rulings by courts of cassation is obtained from the websites of the courts of cassation. These courts publish annual reports on their caseload. In some countries the data is aggregated at the level of all taxes, in others as total administrative cases. To ensure the numbers are comparable across countries I also obtain the full texts of all published rulings of these courts when available. These are processed using a word search program to find which ones deal with taxes. I then compare the amount of cases dealing with taxes to the total amount of administrative cases. I use this to adjust the information from published reports, when the level of aggregation is not total tax related cases.

Validation of the measure

To validate my measure I look at how often the court of cassation overturns cases of lower courts. This indicates that even courts don't agree on the legal interpretation and can be thought of as an ex-post measure of legal uncertainty. The correlation between my metric and this ex-post measure is 87%. Unfortunately the ex-post measure is not available for most countries and can therefore not be used as a measure for legal uncertainty.

The most common suggestive phrases refer to general principles, a tax avoidance motive, or an undefined 'real' or 'economic' value of non-traded assets. This is in line with survey evidence from Hoppe et al. (2017), who show that the setting of transfer prices, and anti-avoidance rules cause the most uncertainty with interpretation of tax law.

I do not investigate uncertainty about what the law will look like in the future, as this is a topic investigated in Gulen and Ion (2016). However, it is important to rule out that my measure captures the same or a related effect. Gulen and Ion (2016) use a measure from Baker et al. (2016), which has also been constructed for several European countries. The Baker et al. (2016) measure is based on political and macro uncertainty using newspaper mentions of uncertainty. I correlate it with my measure and find the correlation between my measure and this macro uncertainty is less than 2%. Table 1.12 shows correlations between the uncertainty measure and several country level variables related to law, law enforcement, and courts.

1.2.3 Theoretical framework

Legal uncertainty creates room for multiple interpretations of the law. A company can use this room for interpretation to interpret the law in its favor. Utilizing such a beneficial interpretation leads to a decrease in the expected tax rate. On the other hand, the tax authority is bound by principles of justice and equity, not profit maximization, making the effect of 'legal uncertainty' asymmetric. Nevertheless, there is a risk of being audited by the tax authority and end up in costly litigation.[5]

The lower expected tax rate will make companies want to use the legal uncertainty to its benefit. This reduces expected taxable profit. The theoretical framework is based on DeAngelo and Masulis (1980), who show that the effect of corporate taxes on leverage depends on non-debt tax shields. Tax shields lose their value when profit in some states of the world are negative. Decisions on tax planning are made before profits are known. Debt-tax shields are only of value when the company is profitable. If profit in some states of the world is negative the value of the tax shield is reduced. Since non-debt tax shields reduce taxable profit, they 'crowd out' debt tax shields.

Hypothesis 1: A relative increase in the opportunities for uncertain tax planning strategies is associated with a decrease in the use of the certain tax planning strategy.

[5]Setting up tax planning strategies is also costly. It might involve restructuring the company or hiring outside council.

Hypothesis 2: Higher legal uncertainty leads to lower leverage.

However, when the risk of an audit is higher the company might dislike using legal uncertainty. As this increases the expected litigation costs, and risk of fines.

Hypothesis 3: Higher audit probabilities reduce or possibly reverse the effect of legal uncertainty on leverage.
So legal uncertainty creates room for interpretation, which allows companies to engage in tax planning. Risk of ending up in court and potentially losing a case, curbs tax planning behavior.

1.3 Methodology and measurement

1.3.1 Identification

In this section I describe my identification strategy. I discuss how I identify the effect of legal uncertainty and audit probabilities in a country, before discussing several hurdles and how I overcome them.

Legal uncertainty and audit probability

I construct a proxy for legal uncertainty and audit probability in a country. Hypothesis 3 suggests that the interaction of the two is relevant, as higher audit probabilities increase the probability a company will suffer a sanction.

Hypotheses 1 and 2 suggest the following regression equation:

$$\begin{aligned}\text{Leverage}_{ict} = \beta_1 * \text{Legal uncertainty}_{ct} + \beta_2 * \text{Audit probability}_{ct} + \beta_3 * Interaction_{ct} \\ +\beta_4 * \mathbf{X}_{ict} + \beta_5 * \mathbf{Z}_{ct} + \gamma_{ic} + \zeta_t + \epsilon_{ict}\end{aligned} \tag{1.2}$$

Where c indicates the country, t time and i the multinational. β_1 captures the effect predicted in hypothesis 2. Interaction is the interaction term between legal uncertainty and the audit probability and its coefficient β_3 captures the effect predicted in hypothesis 3. $\mathbf{X}$ is a vector of company level control variables which includes tangibility, profitability, sales and depreciation. These are based on findings in Rajan and Zingales (1995) and are standard in the literature. $\mathbf{Z}$ is a vector of country level controls, which includes corporate tax rates, GDP growth and interest rates.

Throughout, I include a year and a multinational-country fixed effect. These control for year-specific Europe-wide factors and entity-specific time-invariant unobserved heterogeneity. I cluster standard errors at the multinational level, as leverage decisions within a multinational can be correlated. Tax changes occur at the country level, which would make this a logical level to cluster at as well. There are too few clusters, so instead I cluster by the countries the multinational is present in. I also cluster on industry-country levels in additional tests.

Endogeneity

A possible problem in identification is the fact that the use of tax planning strategies is a choice of the company. Some companies may elect to use uncertain strategies, while others elect to use more conservative strategies. This means that the company chooses its tax planning strategy and as a result the amount of uncertainty it faces, thereby creating an endogeneity problem. I account for this by measuring the uncertainty inherent in the law. This inherent legal uncertainty is exogeneously imposed on the company by the government. The only way to adjust exposure is by entering or exiting a country. Therefore, I adjust for endogeneous entry in a robustness test.

Measuring legal uncertainty at the country level also has downsides. Not all companies are necessarily equally affected, due to some companies being in a better position to use legal uncertainty. This makes the measure noisier, making it less likely to find a result. Furthermore, by measuring at the country-level it is harder to rule out alternative explanations, as the measure does not change across companies in the same country and year. This means that it could be correlated with other country level variables.

This is why I use multinational companies for my research. For multinational companies I can identify actions which indicate more uncertain tax planning strategies. I can test for the prevalence of these strategies. Any alternative explanation for the change in leverage will also have to explain the increase in the use of more uncertain tax planning. This is in line with suggestions by Klassen and Mescall (2015); Klassen et al. (2017) who show that multinationals can use the fact that they have profits abroad for tax planning purposes. They also suggest that access to tax havens can be important. I exploit legal uncertainty surrounding the opening up of several tax havens in Section 1.6.

I include a multinational-country fixed effect to control for time invariant effects like a company's aversion to uncertainty in tax planning. This implicitly assumes a multinational's preference for uncertain tax planning is non-time-varying. I also include company level fundamentals as controls as they may affect tax planning choices.

A last issue is that of reverse causality. Companies could lobby for more legal uncertainty or enter in countries which have higher legal uncertainty to make use of the gaps in legislation this might create. Similarly, the legislator may create legal uncertainty to make use of the risk aversion of companies to keep them from using gaps. For this to be a problem, companies on average have to act in a way that would cause a response by the government in their favor. My measure for legal uncertainty is based on both a legislative and judicial component. This means that companies will have to capture both branches of government to create this reverse effect. Or the judicial branch needs to take an active interest in creating legal uncertainty, contrary to their mandate. In Section 2.6 I explicitly test for lobbying using insights from Hill et al. (2013).

1.4 Data and summary statistics

1.4.1 Data

I use accounting and ownership information from Bureau van Dijk's Orbis database. I construct a sample consisting of multinational companies, as I can detect non-debt tax planning strategies for them.

I obtain corporate tax rate data from the Ernst & Young's "World Wide Corporate Tax Guides". Ernst & Young is a large accounting and advisory company that summarizes the tax systems around the world on a yearly basis. Changes in tax rates are available in these guides. Data on the macro-economic environment is obtained from Datastream and the World Bank. All variables are defined in Table 2.19.

Legal uncertainty and audit probabilities

For the expectation of being audited I use the actual amount of audits conducted in a country as a fraction of companies active in the country. While this is admittedly a rough proxy, as some companies are by their nature more likely to be audited than others, it does ensure that the behavior of the company does not affect my proxy. This makes it exogeneous to the choices of any one company located in the country as it cannot affect the countrywide level of audits.

Information about audit probabilities are directly obtained from the tax authority's annual reports. Countries don't all specify exactly the same information. However, all countries in my sample publish information on the total number of thorough audits of companies (audits where the tax inspector went on site, or conducted a full audit of the books). I divide this number by the total amount of corporations in the country, which I obtain from the governmental statistics agencies of the respective countries. Ideally, I would use the audits with respect to corporate income taxes only. However, this data is not available for all countries, due to the fact that audits often cover multiple taxes. Therefore, I use total corporate audits. After collecting the information for a specific country, I revisit the annual reports of the other countries to ensure the definition of an audit is comparable across countries.

I construct this audit probability and my legal uncertainty measure for 10 countries: Austria, Belgium, Czech Republic, Germany, Spain, Finland, France, Netherlands, Poland, and Sweden. Reporting on auditing and court cases is more extensive in Northern Europe. Furthermore, some of the legal information is only available in the language of the country itself. The availability of English texts, language proficiency, or availability of proficient translators limits the extent to which I can retrieve information for additional countries.

I merge this data with company data from Bureau van Dijk's Orbis database over the years 2005-2011. I use a dataset mapping the entire structure of the multinational. The dataset with the entire multinational structure will make it easier to detect non-debt tax planning strategies. The dataset used is the same as used in Brok (2018) and includes information on a large subset of multinationals in Europe. This dataset aggregates the information of a multinational at the country-year level. The unit of observation is a multinational-country-year. A multinational with three

firms in the Netherlands and two in Belgium will show up in the data as one observation in the Netherlands and one in Belgium. This ensures that multinationals with many subsidiaries don't get over represented in the data.

1.4.2 Summary statistics

Variables are defined in Table 2.19. In Table 1.3 I show the summary statistics. The suggestiveness ratio shows the ratio of suggestive articles to total articles in a law. Figure 1.4 shows the development of the suggestiveness ratio and its components over time. The most incomplete law contains almost 13% suggestive articles. The total amount of articles in a law can be as many as 790 in Sweden or as few as a 100 in Finland. Larger laws don't necessarily have the lowest suggestiveness ratio. In 2005 Sweden has a corporate tax law consisting of 790 articles and a suggestiveness ratio of 6.6%. Germany has a suggestiveness ratio of 5.7%, using only 250 articles of law, while Austria uses 197 articles, but has a suggestiveness ratio of 10.15%. This shows that there is no clear relation between the size of the law and the suggestiveness of the law. While a bigger law can legislate for more specific cases, it does not necessarily resolve legal uncertainty by doing so.

The suggestiveness ratio has a substantial cross-country variance, however the variance across time is considerably smaller. The fact that the variance across time is limited is not surprising, as most changes to the tax law are small. The most consistent country is Finland, which added no suggestive articles and only expanded its corporate tax code by 2.1%. Belgium on the other hand increased the amount of articles in its tax code by 47% and the amount of suggestive articles by 51%. The biggest change in the suggestiveness ratio is observed in the Czech Republic, which despite only increasing total articles by 19%, doubled the amount of suggestive articles. Spain is the only country to reduce its tax code over the sample period, reducing the total size of the code by a net amount of 1 article. Increasing tax codes don't necessarily carry more legal uncertainty. The Dutch tax code expanded by 2.1%, but reduced the amount of suggestive articles by 25%. It is important to note that the above numbers are based on the net changes in articles. Countries can simultaneously drop and introduce new articles of law.

The average amount of court cases is 1909. It is important to point out that this is based on the summed total for the country. This means that the 2007 amount of case law consists of case law from previous years, plus the new case law of that year. On average courts of cassation produce around 300 rulings a year. The amount of rulings is not dependent on the size of the country. For instance, France produces an average of a 125 cases a year, while the Netherlands produces almost 200. These rulings maintain relevant over time, even if the article a case relates to does not exist anymore, the principle can still apply similarly in different cases. Figure 1.5 shows the development of the judicial component over time.

The court cases measure is on average bigger than the suggestiveness ratio, leading to negative mean legal uncertainty of -1.056. This has no real meaning as the measure can only be interpreted in relation to other countries and years.

The legal uncertainty measure changes substantially over time (standard deviation of 0.54) and across countries (standard deviation of 0.96). The time variance

is mostly, though not exclusively, due to case law. The variance across countries is strongly affected by both the suggestiveness ratio and case law. This suggests that the legislative branch writes the law and only adjusts were necessary, or when a specific new goal needs to be obtained, creating limited variance across time. The judicial branch is then left to its role of interpreting the law, creating substantial variance over time. The laws that countries write are unique, creating the cross-country variance. Courts of different countries also function differently, adding to this variance. In Table 1.2 I show the results of a naive regression of leverage on the two components of my uncertainty measure. It can be seen that both components are statistically significant. An increase of one standard deviation (0.025) in the legislative component is associated with a 0.054 drop in leverage, while an increase of one standard deviation (0.796) in the judicial component is associated with a 0.017 increase in leverage.

The audit probability is fairly small, this is due to the fact that this is the probability of being audited for any company in a country. Bigger companies are more likely to be audited. However, audit probabilities by size class are only available in three countries. I verify that for these countries the relative ranking is the same for the total audit probability and the size-adjusted audit probability. To compensate for different audit rates at different size buckets I will use a dummy indicating above or below median audit probabilities throughout the paper. Since I control for size in all regressions, this captures the effect of a relatively high audit probability for a given size.

I define leverage as interest bearing debt over total assets minus non-interest bearing debt.

Figures 1.2 and 1.3 show the correlations between the suggestiveness ratio, court cases, and leverage. Figure 1.2 shows the relation when audit probabilities are high. At high audit probabilities legal uncertainty and leverage are positively correlated according to Hypothesis 2. Therefore, we would expect a negative correlation between court cases and leverage and a positive correlation between the suggestiveness ratio and leverage. This is exactly what the figure shows. Figure 1.3 shows the same relation, but for all companies. Hypothesis 1 suggests the opposite relation should be observed. Figure 1.3 shows that leverage trends upwards, while the suggestiveness ratio has no such upward trend.

1.5 Results

1.5.1 Legal uncertainty and audit probability

The results of this section will shed light on the roles of the different branches of government in creating, augmenting and relieving the effects of legal uncertainty. The legislative branch designs the law which caused the legal uncertainty, the judicial branch reduces the amount of legal uncertainty. The audit probability captures the role of the executive branch. Testing hypotheses 2 and 3 will show how legal uncertainty and the audit probability affect corporate policies and thereby how the different branches of government impact company decisions through legal uncertainty.

Effect on leverage

Hypothesis 2 suggests that legal uncertainty should have a negative effect as it increases the possibilities for tax planning. The interaction between the two should positively affect leverage according to hypothesis 3. This is exactly what I find in Table 1.4. At low audit probabilities a one standard deviation increase in legal uncertainty is associated with a 0.011 decrease in leverage. Hypothesis 3 suggests that this effect should be reduced when the audit probability is high. The Interaction shows the result of interacting a high audit probability with legal uncertainty. The audit probability does indeed temper the effects of legal uncertainty. It is important to note that the average high-audit probability is 3x higher than the average low-audit probability. So the effect of an audit represented here is equivalent to a 2 standard deviation jump.

In column 4 we can see that the legal uncertainty faced by other companies in the same multinational group have the same effect on domestic leverage as domestic legal uncertainty does. This suggests that the multinational as a whole sets its tax planning strategy, based on the combined options and risks.

In column 5 I investigate whether the effect is stronger for companies with top quartile profits. These companies have a higher incentive to use uncertain tax planning strategies as they can benefit from them more and therefore more easily bare the costs of setting up these strategies. At the same time these companies are more likely to be able to use both uncertain tax planning strategies and debt-based tax planning without hitting the lower bound (zero profit). The fact that I observe a stronger effect for profitable companies suggests that the first effect is stronger.

Effect on uncertain tax planning

While it is hard to pin down actual strategies due to their complexity, there are some actions that can suggest tax planning.

Following Huizinga et al. (2008) I test whether there are indications of profit shifting as a result of my measures. When legal uncertainty increases companies have more options for tax planning. One such option is shifting profits to low-tax countries. Higher legal uncertainty in the high-tax countries can allow companies to shift more profits to low-tax countries. I test this by looking at how the exposure to legal uncertainty in high tax countries affects the natural log of EBIT in both low and high tax countries. I define low-tax countries as any country with a statutory tax rate of more than one standard deviation below the average tax rate for the whole multinational company.

In the low-tax countries we would expect an increase in EBIT as the company tries to shift income towards these countries. In the high tax countries the opposite should occur, as we expect income to be shifted out. As always, I expect this effect to be larger for more profitable companies, as these benefit more from tax planning.

Control variables are as in Schenkelberg (2018); Huizinga and Laeven (2008), who include the Cobb-Douglas production factors, GDP growth, and foreign and domestic tax rates. I include a company fixed effect, contrary to earlier literature where only an industry fixed effect was used. To ensure that the time period used does not affect the estimation, I also add a year fixed effect to control for any year

specific effects on profit.

Table 1.5 shows the results. We can clearly see that the signs for the low-tax countries take the expected values. The coefficients for the high tax countries show the opposite signs, which is suggestive of profit shifting behavior. The effect of a standard deviation change in exposure to legal uncertainty in high tax countries is about a 40% increase in EBIT in the low-tax country. It is important to note that EBIT in low-tax countries is substantially lower than it is in high-tax countries. So while there is substantial profit shifting, the majority of profit remains in the high-tax countries.

It is important to note that the r-squared is very high. This is driven by the control variables. Huizinga and Laeven (2008); Schenkelberg (2018) already displayed high r-squared as the Cobb-Douglas like controls explain most of the profit of a company. Adding the company and year fixed effects further drives up the r-squared. Using the same specification as in the previous literature already explains 90% of the variation in the data. The two production factors have combined coefficients of 0.922, suggesting that they together almost fully explain changes in the profitability of a company. Company fixed effects, like quality of management and relative technological superiority, as well as time fixed effects such as the overall stance of the economy seem to explain much of the remaining variation. Tax effects, like the effect of the tax rate itself, as shown in Huizinga and Laeven (2008), and my legal uncertainty measure explain the rest of the variation.

1.6 Quasi-natural experiment

1.6.1 Institutional setting

In the European Union courts can ask the European Court of Justice (ECJ) for a ruling on any aspects of a case that deal with European treaties and regulations. Judgments from the ECJ are applicable to the entire EU.

One case of particular interest is the so called Cadbury Schweppes case (European Court of Justice, 2006). In this case a law in the United Kingdom was under contention. The UK applied a Controlled Foreign Company rule (CFC). Several countries used CFC rules and while the details differ from country to country, they all work in a similar fashion. A company which has a subsidiary in a country with a tax rate below a specified percentage is subject to additional tax on (parts of) the profit of that subsidiary for the difference between the foreign and domestic tax rate. Figure 1.1 shows an example. Company A is located in a CFC country and has a subsidiary in a country with a low corporate tax rate like Ireland and a subsidiary in Austria, which is not a low tax country. Company B is located in a non-CFC country, but also has a subsidiary in a low tax country and in another country, which is not a low tax country. Company A pays 17.5% additional tax on (part of) the profit from the Irish subsidiary, but no additional tax on the Austrian profit. Company B pays no additional tax on either of the subsidiaries, as the parent company is not located in a CFC-country.

In the Cadbury Schweppes case the ECJ judged that the indiscriminate application of CFC rules to all companies with a low tax subsidiary is a violation of EU

basic freedoms. The application of the rules to the profits of EU subsidiaries was deemed a limitation on a company's freedom to establish anywhere in the EU. Such a limitation to the freedom of establishment is allowed under EU-law if it serves an important function like curbing tax avoidance. The CFC rules presumed tax avoidance on the basis of the location of the subsidiary, which the ECJ deemed a non-proportional response to possible tax avoidance. The ruling meant that national tax authorities have to prove that a company's main motivation for establishing in the low-tax EU country is a reduction of the taxable base. This increased legal uncertainty, as the application of CFC rules now required that the company lacked economic substance reasons beyond tax avoidance for establishing the subsidiary. What economic substance is, was not clearly defined.

The ruling states: *(...) such a tax measure must not be applied where it is proven, on the basis of objective factors which are ascertainable by third parties, that despite the existence of tax motives that controlled company is actually established in the host Member State and carries on genuine economic activities there.*

1.6.2 Identification

My identification strategy uses the fact that for instance a UK company (30% corporate tax rate) with a subsidiary in a low-tax country like Ireland (12.5% corporate tax rate) is affected by the shock. However, a Belgian company (34% corporate tax rate) with a subsidiary in Ireland is not affected, as Belgium did not have CFC rules. Using non-CFC-country companies with subsidiaries in the same country as the CFC-country company mitigates concerns about endogeneous location choice. The identifying assumption is that the control group was exposed to the same economic and regulatory environment with one major exception, the Cadbury Schweppes ruling. Looking at Figure 1.1, I compare Company A with Company B, controlling for tax rates, country and company characteristics. This ensures that the subsidiaries are based in a similar location. The only difference is the country of the parent. In additional tests I compare two companies, both located in a CFC country, one with and one without a subsidiary in a low-tax country. This ensures that the parent countries are comparable, while the subsidiaries are in different countries. Finding similar results in both cases ensures that the effects are not driven by local economic factors.

It is important to point out a characteristic of the CFC rules. Without CFC rules it is beneficial for a low-tax subsidiary to provide a loan to the high tax parent. The parent can deduct the interest at a higher rate than the rate charged on the interest received by the subsidiary. With CFC rules the interest received would be additionally taxed for the difference between the low and high tax countries' tax rate, eliminating the benefit of lending to the high tax parent. The change in CFC rules could therefore lead to an increase in the parent's leverage. However, my legal uncertainty hypothesis suggests that there should be a reduction in leverage, as there are more profitable ways of reducing the tax bill. The result I find is therefore likely to be a lower bound.

I cluster standard errors by parent company. In additional tests I cluster by country-industry.

1.6.3 Data

I use a different data sample for this quasi-natural experiment than for the main results. This is necessary as the availability of data to construct the legal uncertainty measure and audit probability was limited to 2005 and beyond, but the shock requires me to use data from 2004. The data sample ends in 2008, ensuring two years before the shock, the year of the shock, and two years after it. I use parent companies which directly own (part of) at least one foreign subsidiary. For each of these companies I determine whether it is located in a country with CFC-rules and whether or not it has a subsidiary in a low-tax country. If a parent has both subsidiaries in low-tax countries and non-low-tax countries it is classified as having a low-tax subsidiary. After all, the parent company obtains the new opportunities for tax planning regardless of where the other subsidiaries are located. This means that the example in Figure 1.1 (a) is a treated company, despite also having a subsidiary in a country with a tax rate that does not incur an additional tax under the CFC rule.

I do not impose a restriction on the ownership percentage of the parent as missing data would restrict the sample too much. If a parent does not own a substantial part of the subsidiary it would not benefit from the change in CFC-rules, since the benefits of tax planning would have to be shared with outside shareholders. Therefore, I would not expect to observe an effect for these cases, likely biasing against finding a result.

Denmark, Germany, Hungary, Luxembourg, Norway, Portugal and Sweden had CFC rules in effect at the time of the ruling. Each country used its own definition of what a low-tax country is. Depending on the specific country there were between 3 and 10 countries in Europe marked as low-tax countries.[6]

Information about the details of the CFC rules are obtained from national laws. Differences in the rules across countries mostly entail what qualifies as a low-tax country. Some countries like Finland exclude all countries with which they have a tax treaty. Others like Germany include all countries with a corporate tax rate below 25%. Panel A of Table 3.1 details which countries had CFC rules and what tax rate is considered low under that countries rule. Panel B details the tax rates in the year prior to the shock (2005) for all countries in my sample. Finland is excluded from the sample as it did not apply the CFC rule to countries it had a treaty with, which would exclude all EU countries. Italy is excluded as it used a blacklist of countries which are low-tax. The only EU country on this list was Slovakia. France and Spain are excluded as they changed their CFC rules during the pre-period.

1.6.4 Effect on leverage

The treated companies are companies located in a CFC country, with a subsidiary in a low-tax country. The control group are companies in non-CFC country with a subsidiary in a low-tax country. In Figure 1.6, I investigate whether there were different trends in leverage before the shock. I use a regression based approach

[6]Note that the application of CFC rules on profits from non-EU subsidiaries is not in violation of EU law.

(Angrist and Pischke, 2013), where I include an interaction between year dummies and the assignment to the treated group.

$$Leverage_{ict} = \sum_{t=-2, t\neq 0}^{2} Treatment_{it}\beta_t + X_{it}\beta_1 + Z_{ct}\beta_2 + \epsilon_{ict}$$

I use the year before the shock as a baseline, 2005 is therefore omitted. The coefficients can be interpreted as a difference compared to this baseline. Figure 1.6 shows that in 2006, the year of the shock, the leverage of the treated companies dropped compared to that of non-treated companies. More importantly, the 2004 coefficient is zero, meaning there is no difference with the baseline. This shows there was a common trend before the shock. The rather quick effect might be due to the use of internal debt to quickly respond to changes in the tax environment.[7]

In Table 1.8 I show the effects of the Cadbury Schweppes ruling on leverage. The difference between the domestic and foreign tax rate is significant and positive, this is in line with Huizinga et al. (2008) and suggests that debt is shifted to the country where it can be deducted against the highest interest rate. The coefficient on the domestic tax rate is in line with trade-off theory (Kraus and Litzenberger, 1973). A one standard deviation increase in the tax rate leads to a 0.017 increase in leverage. This is in line with findings in Huizinga et al. (2008), which use a similar sample.

Hypotheses 1 and 2 suggest that the treatment should have a negative effect on leverage. This is due to the increase in legal uncertainty caused by the Cadbury Schweppes ruling. This increases non-debt tax planning opportunities and therefore reduces debt based tax planning. Table 1.8 shows that the treatment has the expected negative effect on leverage. The coefficient implies that being part of the treatment group has the same effect on leverage as a tax rate decrease of 3.5 percentage points.

In column 2, I use a different control group. This group includes companies from CFC countries which did not have low-tax subsidiaries before the shock. This is an intention to treat analysis, as I use the initial treatment assignment, even though some of the companies might select in to treatment. I include these companies in the control group here. As one would expect, the coefficient is slightly smaller for this adjusted control group.

In column 3 I make sure that the effect is indeed related to uncertainty and not just an overall increase in potential benefits. I interact the treatment effect with a dummy for an ultimate owner being a non-diversified shareholder. Since the information is on ultimate ownership is not available for a large fraction of the companies I use the larger control group used in column 2. A shareholder is classified as non-diversified if the company is held by a large family or management. These types of owners have been shown to be less risk seeking Faccio et al. (2011). If the effect of the treatment is indeed due to firms using the increased legal uncertainty, then we would expect that these companies would react less. This is exactly what I observe.

Cross-sectional differences should arise as a result of the CFC rules themselves. These rules mostly targeted passive income like dividends, interest and royalties.

[7] Desai et al. (2004) show that internal debt of multinationals can be as much as 20% of all debt of a company.

This means that companies in high-tech industries could particularly benefit from the change in the CFC rules. This is investigated in column 4. High-tech industries are those industries which are among the top 20% patent producing industries. The effect is indeed stronger for companies in these industries.

I use further tests to examine the effect is strongest for companies we expect to be more affected. As mentioned in Section 1.2.3 less profitable companies have no incentive for tax planning and should be less affected. Column 5 of Table 1.8, shows the effect is indeed stronger for companies with above average profits.

As mentioned in Section 1.2.3 the substitution of leverage for other tax planning strategies is dependent on the amount of states of the world in which a company expects to earn profits lower than the combined tax planning benefits of both strategies. Companies with more possible states of low profit have more incentive to reduce leverage when other tax planning strategies are used. Therefore companies with higher variance in their profitability are more likely to be affected. Column 6 tests this and shows that indeed the effect is stronger for companies with above average variance in their profit before the shock.

Hypothesis 1 suggests that the decrease in leverage found above is only half of the story. The other half is an increase in the use of more uncertain tax planning strategies. The Cadbury Schweppes case made it beneficial for companies to use low-tax EU countries to reduce taxes. Schenkelberg (2018) investigates the effect of the Cadbury Schweppes ruling on income shifting and finds that companies with low-tax EU subsidiaries who were affected by the shock shifted their income to these low-taxed subsidiaries. This results in company's tax base decreasing in the parent country and increasing in the low-tax country. This means more of the companies income is taxed at a lower tax rate leading to an overall lower tax bill. In line with my findings, the author found that this was especially true for high tech companies.

1.7 Robustness and alternative explanations

1.7.1 Risk aversion

In Table 1.6 I show the effects for both leverage, subsidiary location choice and profit shifting for companies with diversified and undiversified ownership. Faccio et al. (2011) suggest that companies with undiversified ownership are less willing to take risks. This suggests that these companies should be less willing to use legal uncertainty to their advantage, as there is risk involved. The results show that the effect is concentrated in the diversified companies.

1.7.2 Thin-capitalization rules

A popular anti-tax planning tool used by governments are Thin-capitalization rules. These rules put a hard cap on the deductibility of interest when a company has a leverage ratio beyond a given cap. This could drive the effect on leverage if a change in thin-capitalization rules coincides with the change in legal uncertainty or the quasi-natural experiment.

Therefore, I formally test if omitting observations after the change of a thin-capitalization rule changes my results. By excluding observations after a change I ensure that the effect before the change will be captured by the fixed effects. The excluded countries are France after their changes to the thin-capitalization rules in 2007; Belgium after their introduction of the Notional Interest Deduction in 2006; and Germany after the change to their thin-capitalization rules in 2008. The results are presented in column 3 of Table 2.18 and are slightly stronger than before.

1.7.3 Endogeneous entry

A possible problem with investigating the effect of legal uncertainty on company leverage and income shifting is that companies can enter in to high or low uncertainty environments to use the benefits associated with them. This would bias the results. The results in Brok and Homanen (2019) suggest that this concern is justified.

In the shock based sample this problem is already taken into account by using a control group which only contains companies which already had a presence in both the parent and the subsidiary country before the shock.

The problem remains for the legal uncertainty and audit probability regressions. I tackle this problem by dropping companies incorporated after the sample start. This ensures that an increase in operations in a country does not endogeneously affect exposure to the legal uncertainty of specific countries. The results of these tests are shown in Table 2.18 columns 4 and 5, the results are qualitatively unaffected.

1.7.4 Lobbying

A further concern is that companies lobbied for an increase in legal uncertainty. These companies selected into an environment with more legal uncertainty by affecting legal uncertainty directly. These companies might not be reacting to the legal uncertainty, as much as legal uncertainty is reacting to these companies. This reverse causality concern is mitigated by the fact that my measure would require these companies to also capture the judicial branch.

To formally test for this concern I use insight from the literature on the determinants of lobbying. Hill et al. (2013) shows that the main determinant for lobbying is the size of the company. Neretina (2018) shows that only a small subset of companies can effectively lobby for policy changes and that trade associations are not effective at representing smaller companies in the lobbying process.

Detailed data on which companies lobbied on specific laws is not available in most European countries. To ensure my results are not driven by lobbying I omit the 10% largest companies from my sample and rerun the regressions. Columns 1 and 2 of Table 2.18 shows the results. The results are qualitatively unchanged and are economically similar to the ones obtained in Tables 1.5 and 1.4.

1.7.5 Additional tests

- Costs of tax planning

The substitution between debt-based tax planning and other tax planning suggest that the costs of other tax planning strategies are not prohibitively high. Based on the accounting information available it is impossible to determine what alternative tax planning strategies the company is applying. However, it is possible to determine for which firms the costs of debt-based tax planning is higher. Financially constraint firms have an incentive to switch away from debt based tax planning. In Table 1.10 I test this hypothesis. It can be seen that the effect is indeed stronger for financially constraint firms. I use the AS-index suggested by Hadlock and Pierce (2010) as a measure for financial constraints.

- Court efficiency

As my measure for legal uncertainty includes the rulings from courts of cassation it is possible that this is correlated with the functioning of courts. Rodano et al. (2016) show that court efficiency can affect leverage. I include several measures obtained from the Fraser institute to control for this. I include quality of the legal system, legal enforcement of contracts, integrity of the legal system and judicial independence. I also include the summary index provided by the Fraser institute. Most of these proxies only show limited variance for these highly developed countries. Including the World Bank's measure for average time a case takes in court is not possible as it shows no time series variation and therefore drops out, due to fixed effects. Table 1.10 shows the results.

- Tax compliance

I might simply be picking up cultural aversions to tax compliance. I add a proxy for tax compliance from the Fraser institute.

- Employment protection

Serfling (2016); Simintzi et al. (2014) show that employment protection can have an impact on leverage as a result of a trade-off between operating leverage and financial leverage. These authors use shocks to labor regulation to show this effect. Non of their shocks affect the countries in my sample period. To further alleviate concerns that I pick up effects of labor regulations I include a proxy for labor market regulation from the Fraser institute, as well as a proxy for hiring and firing regulation. Table 1.10 shows the results.

- Standard errors

Table 1.11 shows the results utilizing different types of clustered standard errors. The main results use multinational clustering. Column 1 of Table 1.11 shows results for clustering on the countries the multinational is active in. Meaning that all multinationals active in Belgium and the Netherlands are in one cluster, all those active in Germany, Sweden, and France in another, etc. In column 2, I double cluster on multinational and the countries it is active in. In column 3, I cluster by country-industry.

1.8 Conclusion

In this paper I investigated the effect of legal uncertainty on leverage and tax planning. I hypothesized that uncertain tax planning and debt-based tax planning are substitutes and that legal uncertainty and audit probabilities are a key driver of this trade off. Where legal uncertainty creates the room for non-debt tax avoidance and the audit probability curbs te behavior, by creating the risk for costly court proceedings.

I show that legal uncertainty does indeed lead to this same substitution. My measure of legal uncertainty captures the roles of both the judicial and legislative branch of the government. I show that the judicial branch on average alleviates legal uncertainty, while the legislative branch writes the law that creates the legal uncertainty. The executive branch can mitigate the effects of uncertainty on leverage, as higher audit probabilities lead to less substitution. I verify the results using a shock created by the ECJ and show that this substitution does indeed happen.

The results of this paper suggest that governments should keep the strength of their enforcement agency in mind when writing the tax law, as they can greatly affect the eventual outcome.

Lastly, the results suggest that companies will utilize tax planning, one way or another. No single policy can eliminate tax planning fully. This is interesting in light of recent policy developments. The OECD has recently proposed new regulation to limit the deductibility of interest on debt (OECD, 2014). These new regulations can curb debt based tax planning. The results in this paper suggest that a law with considerable legal uncertainty accompanied by a high auditing intensity drives companies away from using uncertain tax planning strategies. With the alternative of debt based tax planning cut of by the new regulations it will be interesting to see whether companies find a new avenue for relatively certain tax planning, adjust their preferences for exposure to legal uncertainty, or reduce overall tax planning.

1.9 Tables and figures

Figure 1.1: Multinational corporate structures

Figure (a) displays a company in a CFC-country with a low-tax subsidiary and another subsidiary. Figure (b) displays a company in a non-CFC-country with a low-tax subsidiary and another subsidiary. Company A will pay an additional tax of 17.5% on (some of) the Irish profit. It will pay no additional tax on the Austrian profit. Company B does not pay an additional tax on profits from either of its subsidiaries.

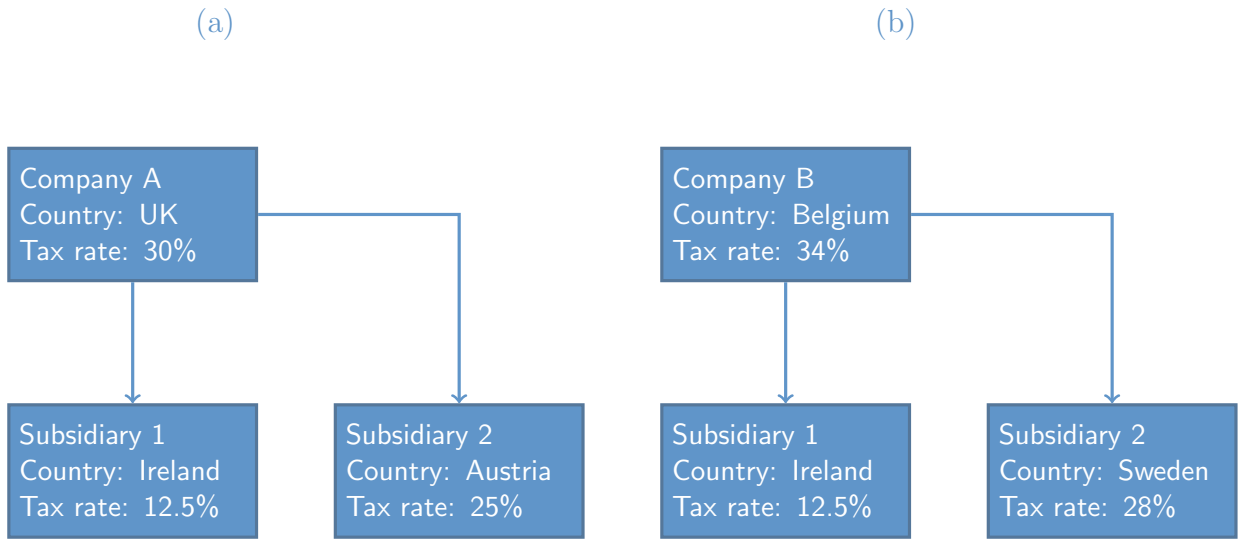


Figure 1.2: Suggestiveness and court cases: High audit

This graph shows the average the suggestiveness-ratio and the average scaled court cases for countries with high audit probabilities. Leverage has been added to show the correlation. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

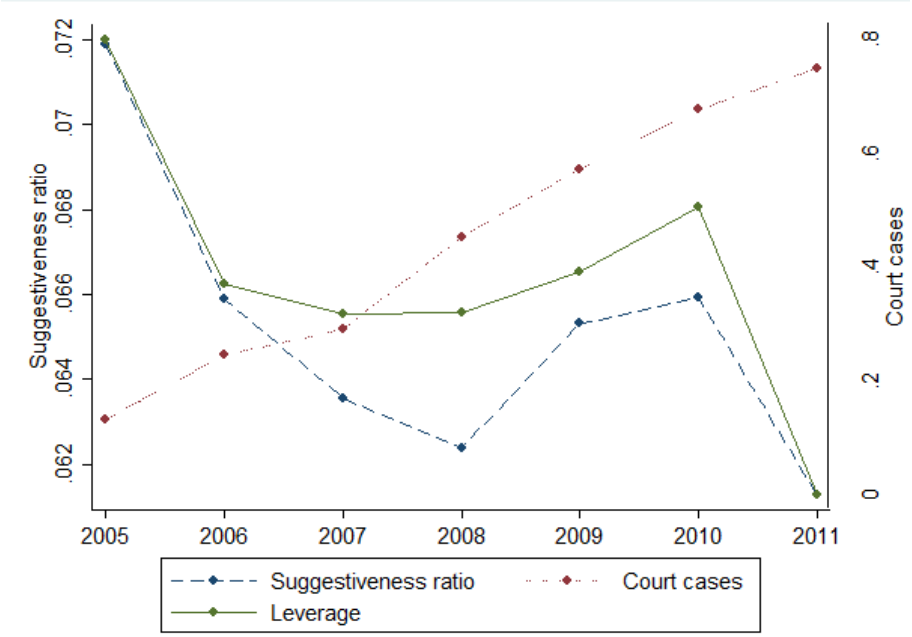


Figure 1.3: Suggestiveness and court cases

This graph shows the average the suggestiveness-ratio and the average scaled court cases for all countries. Leverage has been added to show the correlation. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

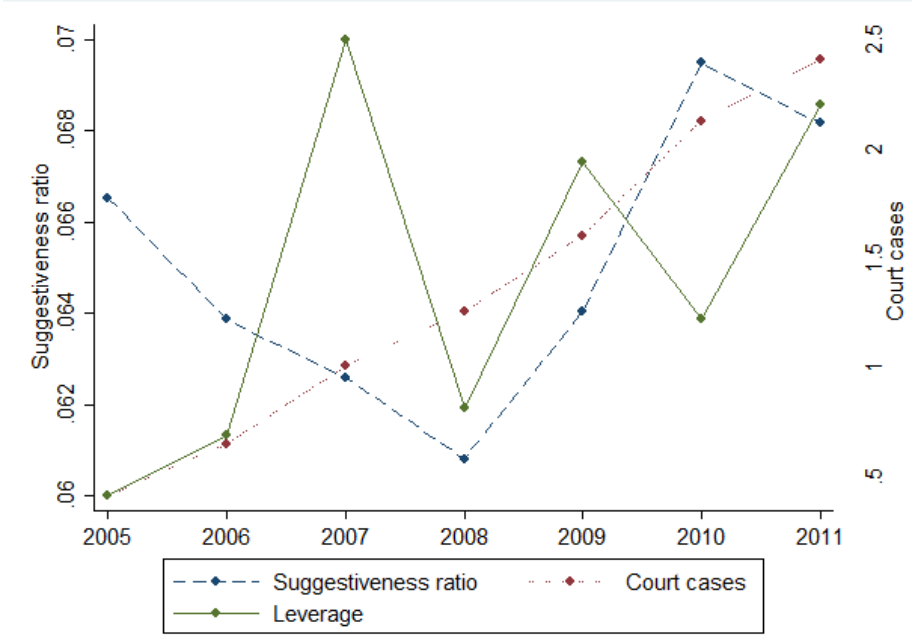


Figure 1.4: The legislative component

These graphs show the development of the amount of suggestive articles, amount of limitative articles, and the legislative component over time, for each country.

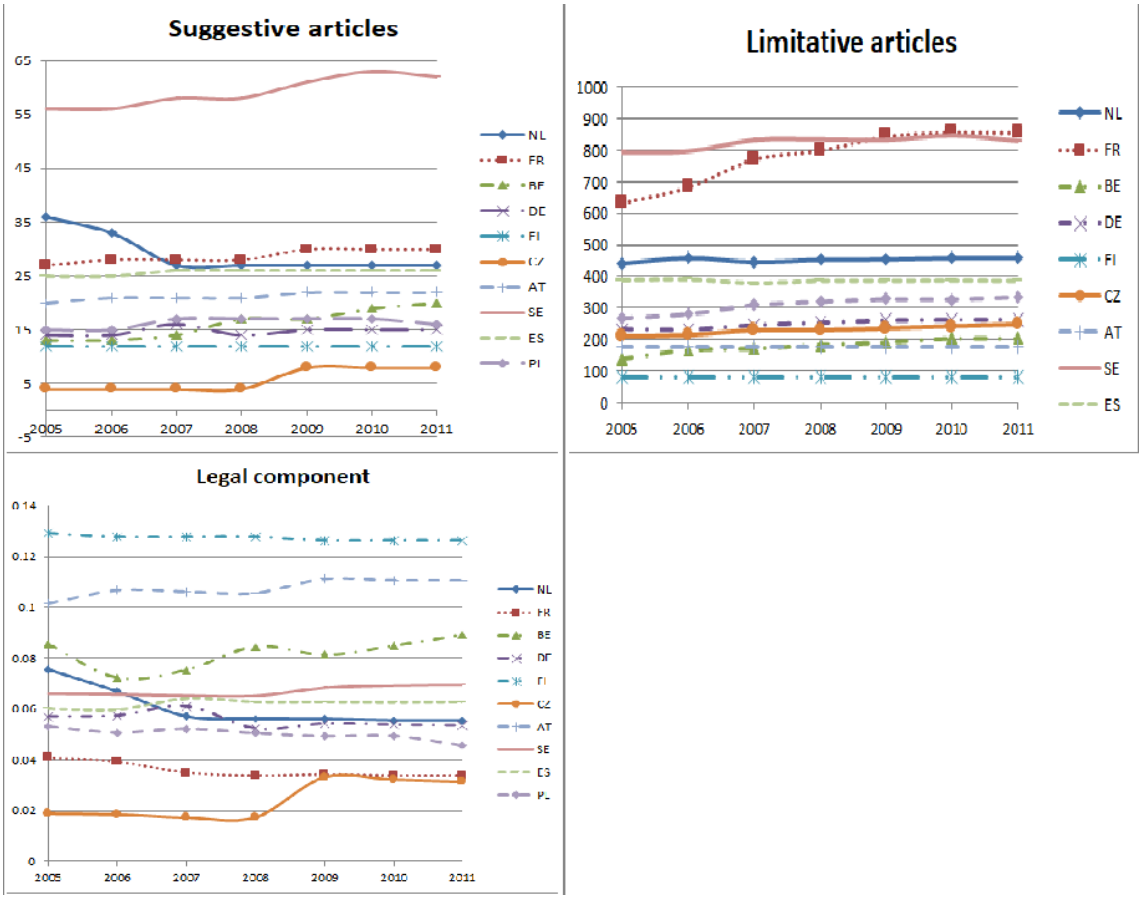


Figure 1.5: The judicial component

This graph shows the development of the judicial component over time, for each country.

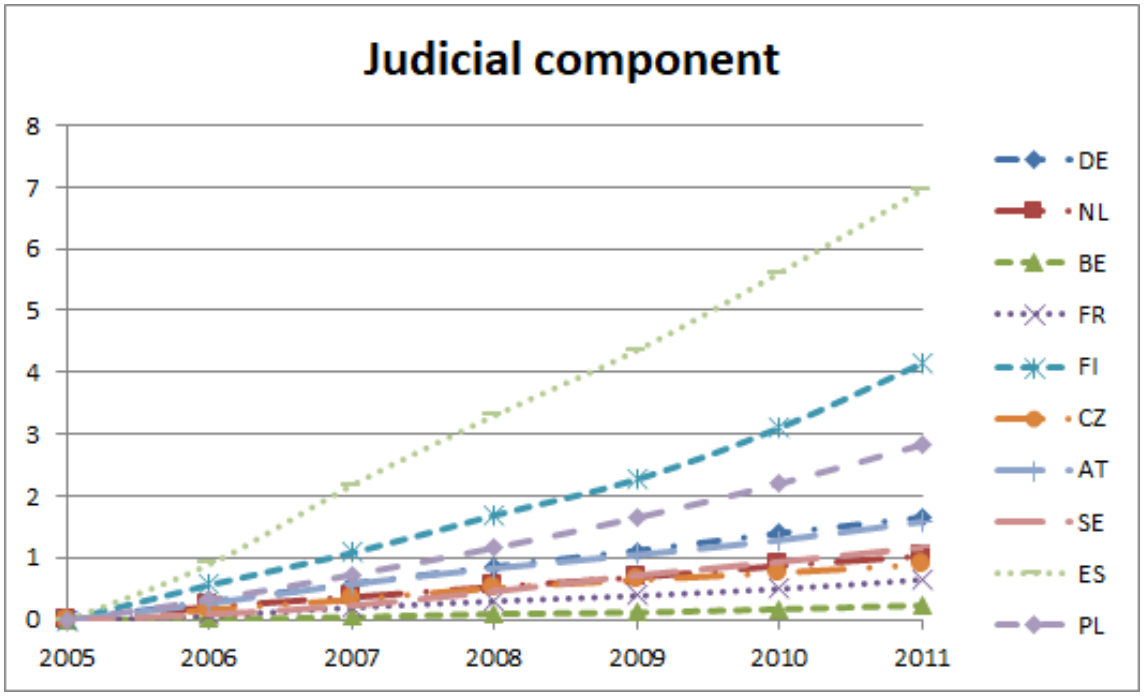


Figure 1.6: Common trend: leverage

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.

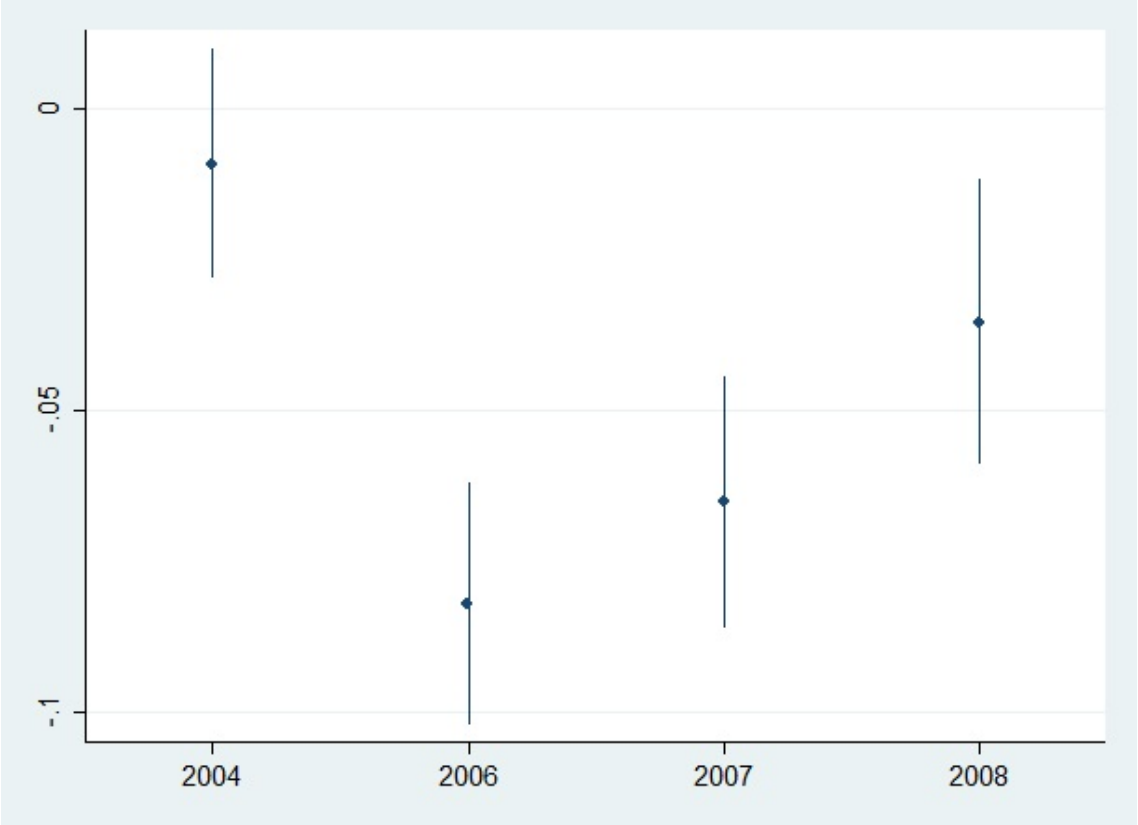


Table 1.1: Variable definitions

This table provides an overview of the variables used throughout this paper. Accounting data is obtained from the Orbis database, tax information is obtained from Ernst & Young World Wide Corporate Tax Guides. The country level variables are obtained from World Bank Data and Datastream. i indicates the multinational company, c indicates the country and t indicates time.

Variable	Description	Source
$Leverage_{ict}$	Measures the liabilities compared to total assets of the entity. $\frac{\text{interest carrying debt}_{ict}}{\text{interest carrying debt}_{ict}+\text{equity}_{ict}}$	Bureau van Dijk's Orbis Database
Total leverage$_{it}$	$\sum_{c=1}^{N} \frac{\text{non-equity liabilities}_{ict}}{\text{total assets}_{ict}}$	Bureau van Dijk's Orbis Database
$Tangibility_{ict}$	Measures the tangible assets of an entity. Proxies for collateral and financing needs. $\frac{\text{tangible fixed assets}_{ict}}{\text{total assets}_{ict}}$	Bureau van Dijk's Orbis Database
$Depreciation_{ict}$	Measures a companies depreciation normalized by sales. It proxies the size of non-debt tax-shields. $\frac{\text{depreciation}_{ict}}{\text{sales}_{ict}}$	Bureau van Dijk's Orbis Database
Sales$_{ict}$	The log of sales. Proxies for the size of companies. $\ln \text{sales}_{ict}$	Bureau van Dijk's Orbis Database
$Profitability_{ict}$	Measures entity profitability, defined as return on assets. $\frac{\text{EBIT}_{ict}}{\text{total assets}_{ict}}$	Bureau van Dijk's Orbis Database
Interest rate$_{ct}$	Country level risk free interest rate.	Thomson Reuters Datastream
$GDPgrowth_{ct}$	Annual GDP growth.	World Bank Data
Tax_{ct}	Marginal corporate tax rate.	E&Y Worldwide Corporate Tax Guide
Tax difference$_{ict}$	Weighted domestic tax minus weighted foreign tax. $\text{Tax}_{ct} * \frac{1}{\text{total sales}_{it}} - \sum_{k=1,k\neq c}^{N} \frac{\text{sales}_{ikt}}{\text{total sales}_{it}} * \text{tax}_{kt}$	E&Y Worldwide Corporate Tax Guide

Table 1.2: Relative strength of the components

This table presents the results a regression of leverage on the measure for legal uncertainty and the two individual components. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage
Legal uncertainty	-0.031***	
	(0.010)	
Legislative component		-2.172***
		(0.668)
Judicial component		0.021*
		(0.011)
Year FE	Yes	Yes
Company FE	Yes	Yes

Table 1.3: Summary statistics

This table presents the summary statistics for all variables. The suggestiveness ratio is the ratio of suggestive to total articles in a law. Court cases are the total amount of court cases up to and including the current year. The other variables are defined as in Table 2.19.

	Mean	St.Dev	25th Perc.	Median	75th Perc
Leverage	0.485	0.268	0.266	0.506	0.687
Uncertainty	-1.056	1.356	-1.431	-0.490	-0.147
Suggestiveness ratio	0.065	0.025	0.049	0.064	0.069
Court cases	1,909	2,317	347	892	2,547
Audit probability	0.033	0.032	0.011	0.017	0.049
Tangibility	0.173	0.216	0.017	0.081	0.257
Profitability	0.049	0.149	-0.002	0.034	0.100
Depreciation	0.065	0.397	0.000	0.006	0.039
Sales	9.633	3.742	7.026	9.054	11.266
Tax rate	0.303	0.057	0.260	0.300	0.344

Table 1.4: Legal uncertainty and audit probability: leverage

This table presents the results from an OLS-regression of leverage on the proxy for uncertainty, a dummy for above median audit probability, and their interaction. Column 1 shows the baseline result. Column 2 adds the audit probability and the interaction. In column 3, I add additional controls. In column 4, I investigate the effect of the uncertainty faced by the other companies in the multinational group. In column 5, I interact the variables of interest with a dummy for companies in the top quartile of profit. Control variables are profitability, tangibility, depreciation, sales, GDP growth, interest, tax rate, and tax difference. These variables are defined as in Table 2.19. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Leverage	(5) Leverage
Legal uncertainty	-0.010***	-0.008**	-0.008**	-0.008*	-0.011**
	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)
Interaction		0.032*	0.037**	0.037**	0.035**
		(0.017)	(0.026)	(0.017)	(0.017)
Audit probability		0.113***	0.117***	0.120***	0.109***
		(0.018)	(0.018)	(0.018)	(0.018)
Foreign legal uncertainty				-0.020***	
				(0.007)	
Foreign interact				0.048***	
				(0.017)	
Foreign audit probability				0.011	
				(0.010)	
Uncertainty * high-profit					-0.005*
					(0.003)
Interaction * high-profit					0.052***
					(0.019)
Audit * high-profit					0.165
					(0.189)
Company controls	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes
Foreign Tax control	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Company FE	Yes	Yes	Yes	Yes	Yes
Observations	24,940	24,940	24,940	24,940	24,940
R-squared	0.791	0.792	0.793	0.794	0.794

Table 1.5: Legal uncertainty and audit probability: uncertain tax planning

This table presents the results from an OLS-regression of log EBIT on the weighted legal uncertainty, above median audit probability dummy, and their interaction. These are interacted with a dummy for high and low-tax countries. Column 1 shows the effect on the whole sample. Column 2 and 3 show the results for above and below top quartile profitability respectively. Control variables are log of tangible assets, log of employment expenditures, sales, GDP growth, interest, tax rate, and tax difference. These variables are defined as in Table 2.19. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Profit shifting	(2) Profit shifting $\geq$ 50% profit	(3) Profit shifting $\leq$ 50% profit
Legal uncertainty * low-tax	0.477***	0.186**	0.015
	(0.075)	(0.076)	(0.086)
Interaction * low-tax	-0.518***	-0.426**	-0.145
	(0.155)	(0.166)	(0.274)
Audit probability * low-tax	-1.945***	-0.429**	-0.316
	(0.211)	(0.188)	(0.410)
Legal uncertainty	-0.113**	-0.182***	-0.005
	(0.050)	(0.053)	(0.072)
Interaction	0.122	0.406***	-0.332*
	(0.099)	(0.101)	(0.181)
Audit probability	0.892***	0.231**	0.506***
	(0.121)	(0.112)	(0.189)
Domestic company controls	Yes	Yes	Yes
Foreign company controls	Yes	Yes	Yes
Domestic country controls	Yes	Yes	Yes
Foreign country controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Company FE	Yes	Yes	Yes
Observations	12,070	4,572	4,337
R-squared	0.961	0.990	0.967

Table 1.6: Shareholder diversification

This table shows results of the regressions of Tables 1.4 and 1.5 split by diversified and undiversified shareholders. Column 1 and 2 show the effect for leverage. Column 3 and 4 show the effect for incorporation. Control variables are as in the original regressions. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage undiversified	(2) Leverage diversified	(3) Profit Shifting undiversified	(4) Profit Shifting diversified
Legal uncertainty	-0.015	-0.016***		
	(0.029)	(0.005)		
Interaction	0.148	0.058*		
	(0.145)	(0.031)		
Audit probability	0.514**	0.091***		
	(0.228)	(0.019)		
Legal uncertainty			-0.296	0.605***
* low-tax			(0.504)	(0.101)
Interaction			0.362	-0.817***
* low-tax			(1.496)	(0.210)
Audit probability			-1.783	-2.079***
* low-tax			(2.073)	(0.257)
Legal uncertainty			0.649**	-0.108*
			(0.250)	(0.060)
Interaction			0.794	0.020
			(0.886)	(0.122)
Audit probability			-0.464	0.684***
			(0.995)	(0.137)
Domestic company controls	Yes	Yes	Yes	Yes
Foreign company controls	Yes	Yes	Yes	Yes
Domestic country controls	Yes	Yes	Yes	Yes
Foreign country controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Company FE	Yes	Yes	Yes	Yes
Observations	820	17,796	415	9,238
R-squared	0.909	0.803	0.960	0.959

Table 1.7: Treated companies

Panel A provides an overview of the countries which had CFC rules in place at the time of the shock and what tax rates qualified as low-tax. Panel B provides the corporate tax rates in the year before the shock.

Panel A: CFC rules

Country with CFC rule	Low tax definition
Denmark	$\leq 23\%$
Germany	$\leq 27\%$
Norway	$\leq 19\%$
Portugal	$\leq 21\%$
Sweden	$\leq 15\%$
United Kingdom	$\leq 23\%$
Hungary	$\leq 10.67\%$

Panel B: Corporate Tax Rates

Country	Tax rate 2005
Austria	25%
Belgium	34%
Czech Republic	26%
Germany	41%
Denmark	30%
Estonia	24%
United Kingdom	30%
Greece	35%
Hungary	16%
Ireland	12.5%
Lithuania	15%
Luxembourg	30.7%
Latvia	15%
Netherlands	31.5%
Norway	28%
Poland	19%
Portugal	35%
Sweden	28%
Slovenia	25%
Slovakia	19%

Table 1.8: Quasi-natural experiment: leverage

This table presents the results from a difference-in-difference regression using the Cadbury Schweppes case as treatment. Columns 1, 3, 4 and 5 use non-CFC country companies with subsidiaries in low-tax countries as a control. Column 2 additionally uses CFC country companies without subsidiaries in low-tax countries as a control. In column 3 the treatment is interacted with a dummy for having a non-diversified ultimate owner. In column 4 the treatment is interacted with a dummy for the companies industry being among the top 20% of industries with the most patents. In column 5 the treatment is interacted with a dummy for above average variance in pre-shock profitability. In column 6 the treatment is interacted with a dummy for above average profitability. The control variables are defined as in Table 2.19. Standard errors are clustered at the company level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Leverage	Leverage	Leverage	Leverage	Leverage	Leverage
Treatment	-0.062***	-0.057***	-0.070***	-0.018*	-0.046***	-0.042***
	(0.008)	(0.008)	(0.012)	(0.011)	(0.011)	(0.012)
Treatment * high-tech				-0.073***		
				(0.019)		
Treatment * profit variance					-0.056**	
					(0.023)	
Treatment * high-profit						-0.043**
						(0.017)
Treatment * non-diversified			0.049**			
			(0.024)			
Profitability	-0.246***	-0.262***	-0.226***	-0.264***	-0.310***	-0.198***
	(0.024)	(0.018)	(0.023)	(0.027)	(0.031)	(0.029)
Depreciation	-0.086***	-0.056***	-0.038***	-0.062***	-0.086***	-0.089***
	(0.017)	(0.012)	(0.013)	(0.020)	(0.022)	(0.017)
Tangibility	0.088***	0.081***	-0.002	0.126***	0.081**	0.089***
	(0.031)	(0.023)	(0.032)	(0.034)	(0.033)	(0.031)
Sales	0.010**	0.015***	0.017***	0.014***	0.015***	0.009**
	(0.004)	(0.003)	(0.004)	(0.005)	(0.005)	(0.004)
Tax difference	0.230***	0.135**	0.052	0.241***	0.283***	0.218***
	(0.081)	(0.062)	(0.081)	(0.078)	(0.092)	(0.081)
Domestic tax	0.320***	0.743***	0.792***	0.250***	0.286***	0.348***
	(0.089)	(0.066)	(0.081)	(0.095)	(0.110)	(0.089)
GDP growth	-0.002**	-0.004***	-0.003**	-0.001	-0.002	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Interest rate	-0.023***	-0.040***	-0.055***	-0.010**	-0.020***	-0.020***
	(0.005)	(0.005)	(0.008)	(0.005)	(0.006)	(0.005)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,014	45,486	27,940	19,879	18,702	26,014
R-squared	0.728	0.720	0.741	0.757	0.733	0.730

Table 1.9: Legal uncertainty and audit probability: Robustness

This table presents the results from robustness tests. Column 1 and 2 show the effects when omitting the largest multinationals. Column 1 shows the result for leverage, column 2 shows the result for profit shifting. Column 3 shows the effect when countries with a change in thin-capitalization rules are omitted. Columns 4 and 5 show the effects on leverage and profit shifting when I exclude all companies that incorporated after the start of the sample. Control variables are as in the original regressions. These variables are defined as in Table 2.19. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Lobbying Leverage	(2) Lobbying Profit shifting	(3) Thin-cap. Leverage	(4) End. Entry Leverage	(5) End. Entry Profit shifting
Legal uncertainty * low-tax		0.380***			0.343***
		(0.058)			(0.077)
Interaction * low-tax		-0.561***			-0.343**
		(0.132)			(0.151)
Audit probability * low-tax		-1.236***			-0.900***
		(0.169)			(0.203)
Uncertainty	-0.013***	-0.096**	-0.016***	-0.011**	-0.100**
	(0.005)	(0.041)	(0.004)	(0.004)	(0.046)
Interaction	0.100***	0.266***	0.158***	0.097***	0.093
	(0.030)	(0.086)	(0.024)	(0.027)	(0.095)
Audit probability	0.150***	0.602***	0.085***	0.096***	0.409***
	(0.026)	(0.103)	(0.023)	(0.023)	(0.112)
Company controls	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes
Foreign Tax control	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Company FE	Yes	Yes	Yes	Yes	Yes
Observations	23,295	14,647	18,436	21,842	13,720
R-squared	0.796	0.965	0.694	0.812	0.967

Table 1.10: Additional robustness tests

This table presents the results from an OLS-regression of leverage on the proxy for uncertainty, a dummy for above median audit probability, and their interaction. Column 1 shows an interaction with the AS measure of financial constraints. Columns 2 through 10 add proxies for labor regulation and the judicial system. Control variables are profitability, tangibility, depreciation, sales, GDP growth, interest, tax rate, and tax difference. These variables are defined as in Table 2.19. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Leverage	(5) Leverage	(6) Leverage	(7) Leverage	(8) Leverage	(9) Leverage	(10) Leverage
Legal uncertainty	-0.012**	-0.015**	-0.015***	-0.015***	-0.015***	-0.015***	-0.015**	-0.015***	-0.015***	-0.013**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Interaction	0.066**	0.067***	0.066**	0.067**	0.066**	0.066**	0.066**	0.067**	0.066**	0.068***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Audit probability	0.150***	0.149***	0.151***	0.151***	0.151***	0.151***	0.150***	0.151***	0.151***	0.149***
	(0.015)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.014)
Financially constraint interacted with uncertainty	-0.007*** (0.003)									
Financially constraint	-0.007** (0.003)									
Hiring and firing regulations		-0.005*** (0.001)								-0.003 (0.002)
Legal System & Property Rights			-0.002 (0.002)							-0.026*** (0.009)
Legal enforcement of contracts				-0.000 (0.002)						
Integrity of the legal system					-0.001 (0.002)					0.004 (0.003)
Judicial independence						-0.001 (0.001)				0.008** (0.003)
Labor market regulations							-0.004*** (0.001)			-0.008** (0.003)
Tax compliance								0.000 (0.001)		0.000 (0.002)
Fraser institute summary index									-0.005 (0.006)	0.023** (0.010)
Company controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Foreign Tax control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,940	24,940	24,940	24,940	24,940	24,940	24,940	24,940	24,940	24,940
R-squared	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.803

Table 1.11: Legal uncertainty and leverage: standard errors

This table presents the results from robustness tests on the clustering of standard errors. Column 1 shows the results for clustering on the countries the multinational is present in. Column 2 shows double clustering on the the multinational and the countries the multinational is present in. Column 3 shows the results for clustering on country-industry. Control variables are as in the original regressions. These variables are defined as in Table 2.19. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)
	Leverage	Leverage	Leverage
Legal uncertainty	-0.008***	-0.008***	-0.008***
	(0.003)	(0.003)	(0.003)
Interaction	0.037***	0.037***	0.037**
	(0.017)	(0.017)	(0.011)
Company controls	Yes	Yes	Yes
Country controls	Yes	Yes	Yes
Foreign Tax control	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Company FE	Yes	Yes	Yes
Observations	24,940	24,940	24,940
R-squared	0.793	0.793	0.793

Table 1.12: Legal uncertainty correlated with other country variables

This table shows correlations between the uncertainty measure and other country level variables.

Frasier institute summary	-0.014
Judicial independence	0.314
Integrity of judicial	0.112
Legal enforcement	-0.013
Reliability of police	-0.092
Business cost of crime	-0.003
Property rights	0.136
Credit market regulations	0.169
Hiring and firing	-0.241
Labor market regulations	0.204
Tax compliance	-0.114
Policy Uncertainty	-0.011

1.10 Appendix A

The measure of legal uncertainty consists of two parts. The first component is the degree of incompleteness of the law. The more incomplete the law is, the higher the uncertainty about the interpretation of the law. Determining the degree of incompleteness is done by using a simple count of suggestive and limitatively phrased articles. Suggestiveness implies that an article sets forth a general rule or guideline using words that do not have a consistent or known meaning in either common language or law itself. Any article that is not classified as suggestive, is limitative.

The laws that I look at are the corporate income tax laws of a country. In many countries the corporate income tax law refers to the personal income tax law for the base calculation of profit. This is due to the fact that the corporate income tax only covers legal entities, however 'natural persons' can also run companies without creating a legal entity. The laws governing the calculation of the profit of these companies are then also applicable to the corporations. This is the case in Austria, Germany, and the Netherlands. Contrary to this system, France, Sweden, and Belgium have a law covering both Corporate and Personal Income Tax. In these cases the chapters on corporate taxation are used as well as the chapters on personal taxation directly referenced in the corporate taxation chapters. The Czech Republic, Spain, Poland and Finland have separate, complete corporate income tax laws.

To ensure the definition of an article is comparable I define the sub articles of every article as an article. This ensures that countries where they have short articles don't end up with substantially higher degrees of incompleteness than countries with large articles. It is important to distinguish between enumerations and sub articles.

For instance:

Article 5 Laki elinkeinotulon verottamisesta (2009) (Finish Corporate Tax law)
The taxable income referred to in section 4 above is among others: 1) price and other remuneration for turnover, investment and fixed assets and for other tangible and intangible assets used in the industry, with the exceptions stated in section 6, subsection 1 point 1, 2) compensation for rent, for work performed or service performed and for other such things, which have been carried out in the form of business activities, (...)

Is one article, enumerating several specific cases (2 displayed here). From context it is clear that the points are in fact enumerating specific cases of the rule stated in this article. On the other hand:

Article 8 Wet op de Vennootschapsbelasting 1969 (2005) (Dutch Corporate Tax law)
1) The profit is understood and determined on the basis of articles 3.8 , 3.11 and 3.12 , 3.13, first paragraph, parts a and h , 3.14, first paragraph, parts b up to and including g, and second to sixth paragraphs , 3.21 up to and including 3.57 and 10.10 of the Income Tax Act 2001 , whereby the entrepreneur is read as a taxable person. 2) The first paragraph does not apply insofar as: a. by or pursuant to this Act or pursuant to Article 3.65 of the Income Tax Act 2001, provision has been made otherwise; b. Article 3.53 of the Income Tax Act 2001 relates to the formation of a retirement reserve; c. the contrary arises due to a difference in essence between the taxable person and a natural person. (...)

consists of multiple articles (2 displayed here), the second of which consists of multiple enumerations (3 of which displayed here). The two articles (indicated by '1)' and '2)') are clearly separate sub-articles. The context and punctuation makes is clear that the points indicated by 'a., b., and c.' are enumerations. Whenever more than two levels are used (e.g. subarticles, enumerations, second layer of enumerations) only the first two are counted as articles. Counting further levels separately would result in the laws using these higher degrees of granularity getting artificially low degrees of uncertainty.

In the two cases shown above the Finnish article 5 of the corporate income tax is rated once as being either suggestive or limitative, based on the content of all the enumerations. The Dutch Article 8 consists of multiple sub-articles, each separately rated as suggestive or limitative.

To determine whether an article is suggestive a list of rules was used. The following types of phrases and their variations are qualified as suggestive:

- Economic/real/fair value (unless referring to exchange traded assets)

Several cases need to be considered.

Article 14 Podatek dochodowy od osób prawnych (2009) (Polish Corporate Tax law)
1. Revenue from the sale of property, property rights or the provision of services is their value expressed in the price specified in the contract. However, if the price, without justifiable economic reasons, significantly deviates from the market value of these things, rights or services, the tax authority determines this income at the market value.

Looking at Article 14 sub-article 1 of the Polish tax law we can see. It states that the price of property needs to be the market value. However, what the market value of property is is in many cases not obvious. Therefore this leaves room to play with the valuation (within reasonable bounds).

3. If the value expressed in the price specified in the contract significantly deviates from the market value of these things, rights or services, the tax authority calls upon the parties to change the value or indicate reasons justifying the price significantly different from the market value. In the event of failure to provide a response, failure to change the value or failure to indicate reasons that justify the price significantly different from the market value, the tax authority determines the value taking into account the expert's opinion. If the value determined in this way deviates by at least 33% from the value expressed in the price, the cost of the expert opinion shall be borne by the transferor or the service provider.

In sub-article 3 of the same article there is once again reference to the market value. However, here it is not discussed that the market value should be used, it is simply indicated what the consequences are of not adhering to correct market valuation. Therefore no room for interpretation is created, as the article only states a consequence. So, sub-article 1 creates the uncertainty by limiting deviations from an unknown market valuation. Sub-article 3 then stipulates the consequences of incorrect valuation. Therefore sub-article 1 is suggestive, but sub-article 3 is limitative.

Article 26 Laki elinkeinotulon verottamisesta (2009) (Finish Corporate Tax law)
Such gains on liabilities and receivables arising from the business activities, with the

exception of financial instruments according to § 5, 8–10 and 13 of this Act, which are valued at fair value, and which are recognized as income in the income statement, constitute income for the tax year and exchange rate losses for the tax year during which the exchange rate of foreign currency has changed. (...)

Article 26 of the Finnish Corporate Tax law shows another example of the use of fair value. However, here it refers to fair value valuation being used for financial instruments. This refers to a choice the company has made with regards to the valuation of a class of assets. Not to an option available to the firm. This is therefore also a limitative article.

Article 44.8a Inkomstskattelag (2011) (Swedish Tax law)

The person who has transferred investment assets according to the Act (2011: 1268) on investment savings account from an account that is not an investment savings account to a separate investment savings account shall be considered to have disposed of the assets against a compensation corresponding to the market value when they were listed in the account.

A last exception to the rule of reference to market value being suggestive is in the case of traded assets. When assets are traded on for instance a stock market. In those cases the market value known.

- Any principles

For instance article 3.20 of the Dutch income tax code (Wet op de inkomstenbelasting 2001, 2005) defines profit as:

The profit attributable to a year has to be determined according to good merchant practice, with a consistent application which is independent of the expected outcome. The consistent application can only be changed if good merchant practice justifies it.

Compare this to the French tax code (Code Général des Impôts, 2005) defining profit as:

Net profit is the difference between the net asset values on the balance sheet at the end and the net asset values at the beginning of the period, the results of which must be used as the basis for the tax reduced by the contribution surcharges and increased with the deductions for the period for the operation.

The Dutch case relies on an undefined concept called good merchant practice. This concept is not defined in the law or parliamentary proceedings. It is established in parliamentary proceedings that it is not equivalent to accounting standards, but it is not established what it is. Therefore this is a suggestive article, while the French article is limitative.

- Normal use or duration

An example of this phrase can be found in the French Article 39 Code Général des Impôts (2005):

The depreciation of capital goods, other than immovable property, building sites and premises used for the exercise of the profession, acquired or manufactured as of 1 January 1960 by industrial enterprises, may be calculated following a declining balance system, taking into account the amortization period used in each type of industry. A decree in Council of State fixes the terms of the declining balance depreciation.

Declining balance depreciation rates are obtained by multiplying the straight-line depreciation rates by a coefficient set at: a. 1.25 when the normal period of use is three or four years; (...)
Compare this to the Czech Article 30 sub-article 1 Zákon České národní rady o daních z příjmů (2005):
In the first year of depreciation, the taxpayer classifies tangible assets into depreciation groups specified in Annex 1 to this Act. (...)

The French law relies on normal periods of use, which are not clearly defined in the law. The Czech law mentions every asset in the mentioned Annex 1. Based on the classification in this annex it is determined what the depreciation time is. The French article is therefore suggestive, while the Czech article is limitative.

- Mostly business like

For example: Article 15ai Wet op de Vennootschapsbelasting 1969 (2005) (Dutch Corporate Tax law)
3 The first paragraph does not apply if: a. the transfer took place in the context of normal business operations appropriate to the nature and size of the transferor and the transferee; (...)

Normal business operations are not defined. This is a suggestive article, it allows companies room in determining what normal business operations are.

- Aimed at avoidance

This is one of the most obvious cases of suggestiveness. Whether an action is aimed at avoidance is hard to determine, it provides a lot of room for interpretation. An example:
Article 52h Laki elinkeinotulon verottamisesta (2009) (Finish Corporate Tax law)
The provisions of sections 52 and 52 (a) to 52 (g) do not apply, if it is clear that the sole purpose or one of the main purposes of the arrangements has been to circumvent or avoid tax.

- (Non-)excessive

Article 39 1 Code Général des Impôts (2005) (French Tax law)
1. The net profit shall be established after deduction of all charges, which, subject to the provisions of paragraph 5, shall include, inter alia: 1 General expenses of any kind, personnel and manpower expenses, rent of the buildings of which the enterprise is a tenant. However, remuneration is only deductible from the results insofar as it corresponds to actual work and is not excessive in view of the importance of the service rendered. This provision applies to all direct or indirect remuneration, including allowances, allowances, benefits in kind and reimbursement of expenses.
Article 18.19 Inkomstskattelag (2007) (Swedish Tax law)
In the case of accounting depreciation, the following applies if depreciation has been made with higher amounts in the accounts than what was accepted in the taxation. The value of the inventories according to the balance sheet at the end of the tax year shall be the basis for calculating the depreciation basis for the next tax year.

Instead, the excess amount shall be deducted by depreciation by 20 per cent per year, calculated from the tax year after the year of depreciation with an excessively high amount

Comparing the above two articles we once again see the distinction between leaving room for interpreting when work is excessive and stating the consequences of having done something excessive. The first is suggestive, the second is limitative.

- Reasonable

Article 17.30 Inkomstskattelag (2007) (Spanish Corporate Tax law)
If the taxpayer carries out a work on a fixed price for someone else's account, the value of the work shall be calculated according to what is reasonable, if there is a community of interests between the taxpayer and the client and there is reason to assume that the provisions of sections 27 - 29 § been used for the taxpayer or the client to receive an unauthorized tax benefit.

It is undefined what a reasonable value of this work is. Therefore it is suggestive.

There are certain phrases one might come across on reading the law that seem suggestive. I discuss several to explain why they were not rated as such:

- Goal of making profit/non-profits

It can be argued that it is hard to establish whether someone has a particular goal. However, this phrase is consistently used in all countries to distinguish between non-profit associations and public services which incidentally make a profit, and incorporated entities with the main purpose of participating in economic activities. For multinational companies as studied in this paper to argue that they don't have a 'goal of making profit' is not feasible. They have substantial assets, sales, and support to suggest economic activity.

- Incidental

Another phrase frequently used to separate non-profits from companies. Also, the nature of the word incidental ensures that the distinction cannot be used to consistently avoid taxes.

Compare Article 9 Ley del Impuesto sobre Sociedades (2005) (Spanish Corporate Tax law):
2. They will be partially exempt from the tax, under the terms provided in Title II of Law 49/2002, of December 23, on the tax regime of non-profit entities and of tax incentives for patronage, entities and institutions without profit motive to which that title applies.

with Article 206 Code Général des Impôts (2005) (French Tax law):
1a) (...) However, are not liable to the corporation tax provided for in 1 the associations governed by the law of 1 July 1901, the associations governed by local law maintained in force in the departments of Moselle, Bas-Rhin and Haut-Rhin, the unions governed by Articles L. 411-1 et seq. Of the Labor Code, recognized public utility foundations, business foundations and congregations, whose management is

disinterested when their non-profit activities remain significant and the amount of their operating income collected during the calendar year in respect of their gainful activities does not exceed 60,000. (...)

The motive of the commercial multinational companies studied is quite clear, they want to make profit on a more than incidental basis. Neither of these is suggestive.

Apart from these cases there are also several additional checks that need to be applied. I have to escape cases in which:

- The rule only applies on request

Article 20 Ley del Impuesto sobre Sociedades (2005) (Spanish Corporate Tax law
3) The taxpayers may submit to the tax administration, under the terms of article 16.6 of this law, a proposal for the application of a coefficient different from that established in section 1. The proposal shall be based on the indebtedness that the taxpayer had could obtain in normal market conditions of people or entities not linked.

When submitting a request it will be clear before filing ones taxes whether or not the suggested coefficient is in line with the law. It is also clear what coefficient will be applied when there is no such request submitted.

- Clearly explained in an earlier or later article
- Clearly defined in a decree
- Clearly defined in another law
- If it refers to a previous choice

Article 4 Einkommensteuergesetz 1988 (2005) (Austrian Income Tax law)
(8) If the higher market value (§ 6 no. 2 lit. b) is not applied to agricultural and forestry holdings for the standing timber, then expenses for the care of the standing timber and reforestation costs shall be deducted as business expenses.

This refers to a decision having been made. While the market value is poorly defined, this is not the issue of this article. The article deals with consequences when a company has elected to value on the basis of the market value. This is therefore not suggestive.

Due to the large amount of exceptions and the different languages of the laws the application of the above rules is done manually.

In constructing the measure for legal uncertainty objectivity is key. Therefore, in the absence of a clear theoretical or empirical reason for putting emphasis on certain aspects of law, no such emphasis was put on it. This means that if it is not obvious or verifiable whether a given article of law is more important than another, it is treated as being of equal importance. For instance, it can be argued that certain articles are more important than others, or that some articles are more likely to matter for certain types of companies (e.g. R&D tax credits are more important in research heavy industries, while an article establishing calculation of

profits in general is important for all companies). However, classification of the importance of articles, either in general or for specific companies, can be hard to bind using an objective rule. Furthermore, industry classifications of companies might not necessarily align with eligibility for more beneficial tax regimes. Therefore, all articles in the law are given the same weight, regardless of perceived importance. This trades-off objectivity for noise.

In determining the suggestiveness of an article case law is ignored. The reason for ignoring case law is that this is the second component of my measure. Suggestive phrasing only becomes clear as case law develops and therefore case law development needs to be taken into account after determining whether articles are suggestive or limitative. Taking it into account beforehand would ignore the time series development of the measure and would give me the discretion to choose when a phrase or article is no longer suggestive.

The case law is a simple count of tax-cases ruled on by the Court of Cassation in a country in a given year. I use cases from the Court of Cassation as this courts main function is the interpretation of law. So these cases are ensured to be relevant for increasing the understanding of the law. Cases that were dismissed (i.e. no ruling on the case is given) for any reason are not included in the count. Again, no weight is given to the particular relevance of the case, as this would involve judging the importance of the articles applicable to the case, the frequency of how often such situations might arise in practice, as well as how much of the uncertainty is resolved by the judgment of the court. This is infeasible from a work load perspective considering the thousands of rulings a year, but would also impose a significant degree of subjectivity in the measure.

The relative importance of the two components is not ex-ante clear. I correlate various degrees of weighting with an ex-post measure of legal uncertainty. The one most aligned with this ex-post measure is used as the main specification in the paper. I also use an equal weighted version in robustness tests. The ex-post measure is based on the percentage of cases overturned on the basis of the interpretation given by the Court of Cassation. More cases overturned suggests there is more uncertainty about the interpretation of the law, even among judges.

Chapter 2

Debt and Taxes: The Role of Corporate Group Structures

2.1 Introduction

Do multinational companies use their corporate financial policy to benefit from differences in tax rates across countries? Companies active in more than one country can use the differences in tax rates across the countries they operate in to reduce their total tax bill. Despite substantial public, and government interest in countering such tax avoidance activities (OECD, 2014), the complexity of multinational companies' group structures (GS) has made it difficult to investigate the effects of tax rates on the use of corporate financial policy for tax avoidance.

Multinational companies consist of firms incorporated in two or more countries standing in a hierarchical relationship to one-another. A holding owns and controls several subsidiaries, which in turn can own their own subsidiaries. These GS can be very complex. This complexity has made it difficult to investigate the effects of tax avoidance behavior on financial decisions of multinational.

In this paper I build a dataset mapping the GS to overcome this problem and I ask the question: do group structures affect multinational companies' ability to use financial leverage to avoid taxes? I am, to the best of my knowledge, the first to provide evidence that the GS itself affects how corporate tax rates affect the leverage of multinational companies. This effect exists alongside two effects previously documented in the literature, but can work in the opposing direction. Ignoring the effects of GS can lead us to significantly mis-estimate the effect of tax rates on the capital structure of multinational companies.

I investigate three effects of corporate income tax rates on leverage: the 'local income effect', the 'substitution effect' and the 'global income effect'. The 'local income effect', is the trade-off theory effect of tax rates on leverage first analyzed by Kraus and Litzenberger (1973), who included bankruptcy costs into the Modigliani and Miller (1963) framework and showed that an increase in the tax rate should lead to an increase in leverage. This effect exists for all firms, regardless of whether they are part of a GS. The 'substitution effect' was introduced by Huizinga, Laeven and Nicodeme (2008), who showed that for a firm in a multinational group an increase in the tax rate faced in one country can lead to a decrease in leverage in another country

the multinational is active in. This effect results from the fact that multinationals allocate debt to the country where it yields the highest net return.

Luciano and Nicodano (2014) show theoretically that guarantees provided in a corporate group structure can reduce bankruptcy risks and thereby allow companies to increase debt capacity. I argue there is an additional effect of corporate group structures on leverage through tax rates, which has been ignored in the literature so far. Multinational companies can construct internal capital markets in which firms provide debt, equity, or guarantees to other firms in the multinational. For instance, a parent firm provides the equity of its subsidiary and can also provide it with guarantees on loans, as well as lend it capital directly. If the subsidiary experiences financial distress, the parent will have to pay on the guarantees; if the subsidiary goes bankrupt, the parent can lose the equity or debt it provided to the subsidiary. The payments on the guarantees and the loss of capital can be tax deductible costs for the parent firm. Such tax deduction means that part of these costs are shared with the government of the parent firm. Effectively, the government of the parent firm shares in the costs of the bankruptcy of the subsidiary. The higher the tax rate in the country of the parent firm, the higher the costs shared with the government. This sharing of the bankruptcy risk reduces the costs of a bankruptcy and thereby allows the multinational company to increase its leverage. I call this effect the 'global income effect'.

The prior literature suggests that firms provide substantial internal capital (Desai et al., 2004) and guarantees to other firms in the GS. Most of the guarantees are provided by parent firms to their subsidiaries, not the other way around (Kolasinski, 2009; Bianco and Nicodano, 2006). The more guarantees and capital a firm provides, the more risk the firm shares with the government. Therefore, the parent firm shares a substantial amount of risk with the government, while the subsidiary does less so. I exploit this fact to identify the global income effect, by comparing the effect of tax changes faced by subsidiaries with those faced by parents.

The tax rate in the country of the parent can affect the domestic leverage, the leverage of the parent; foreign leverage, the leverage of the subsidiary; and the total leverage, the leverage of the multinational as a whole (in this simple setting, the leverage of the parent and subsidiary combined). The local income effect suggests that domestic leverage is positively related with the domestic tax rate and by extension so is total leverage. The substitution effect suggests that domestic leverage is positively related and foreign leverage is negatively related to the domestic tax rate. The total leverage is not affected by the substitution effect. The global income effect is positively related to the total leverage, and non-negatively related with domestic and foreign leverage. Both the global income effect and the substitution effect are related to foreign leverage, but in opposite directions. Ignoring the global income effect would lead one to always predict a negative effect of a foreign tax change, while I show that the effect can also be positive. This has a material effect on the allocation of leverage to the different firms in the GS. Only by taking into account the entire corporate group structure of a multinational can we obtain a complete assessment of how corporate income taxation affects total leverage and its distribution across firms in the group.

I construct a dataset mapping the group structure of a large sample of European

multinational companies and I find evidence for all three effects using 51 staggered shocks to the corporate tax rate (Faccio and Xu, 2015). I use these shocks in three ways. I include changes to the domestic tax rate to capture the local income effect. Following Huizinga et al. (2008) I include the difference between the domestic and the weighted foreign tax rates to capture the substitution effect. The more guarantees and capital a firm provides, the more risk the firm shares with the government. Therefore, include the weighted foreign tax rates, faced higher up in the corporate group structure. This captures the global income effect. Differences in the hierarchical group structures and the size of each multinational's activities in the countries they are active in allow me to create unique weighted foreign tax rates for the multinational as a whole and for different parts of the hierarchical structure. In line with the idea that parents are more likely to provide guarantees and capital to their subsidiaries I find that, on average, the tax rate faced by the parent leads to a bigger global income effect than the tax rate faced by the subsidiary.

The global income effect reflects the fact that a tax increase at the parent level leads to an increase in the total leverage capacity of the multinational company, due to a decrease in the overall bankruptcy costs the multinational bears. However, the global income effect does not state that this additional leverage capacity is used at the parent level. The multinational company can use the leverage capacity at either the parent or the subsidiary level, depending on where it benefits the multinational company as a whole the most. Therefore, the increase in leverage is allocated to the firm in the GS which obtains the highest benefit. This must be a profitable firm, facing a high domestic tax rate. I test this prediction and find that the additional debt capacity is indeed allocated to profitable firms facing higher taxes.

My results suggest that if the additional debt is best used by the foreign subsidiary, the global income effect leads to an increase in the subsidiary's leverage. However, the substitution effect leads to a decrease in the subsidiary's leverage. The combined effect of the global income effect and substitution effect can lead to a net-increase in the subsidiary's leverage. This is contrary to the results from the prior literature. Ignoring the global income effect would lead one to always predict a negative effect of a foreign tax change, while the global income effect suggests it can be positive. This means that the effect of a tax rate change on the allocation of leverage to firms in the multinational company can take the opposite sign to that predicted in the prior literature.

There are two ways in which the results can differ. First, when the parent firm is the most beneficial place to allocate the additional leverage capacity generated by the global income effect, the domestic tax increase has an additional positive effect on domestic leverage, beyond that of the local income effect. The distinction between the two effects is important. The global income effect is the result of a reduction in the bankruptcy risk related to subsidiaries and the leverage capacity it generates is allocated to the firm in the GS that relatively benefits the most. On the other hand, the local income effect is the result of an increase of the benefit of leverage at the parent level and exists regardless of the relative differences in tax rates faced by the firms in the GS. The two income effects combined can have a substantially larger effect on total leverage than the results previously found in the literature suggest. Second, when the tax rate at the subsidiary level changes, the

global income effect will be weak. Therefore, the parent's leverage decreases due to the substitution effect. However, the global income effect is weak and therefore dominated by the substitution effect. In this case, results from the prior literature are accurate.

The results I find in this paper cannot be explained by agglomeration economies, endogeneous entry of new firms, changes to the tax base that are designed to counter debt shifting, or changes in creditor rights.

Lastly, the evidence provided in this paper casts new light on recent policy suggestions of the OECD (OECD, 2014) and EU (European Commission, 2016), designed to curb the use of debt-tax shields. While a step in the right direction, these measures are inadequate to counter the benefits a multinational can obtain by using both its capital and its corporate structure.

The rest of the paper is structured as follows: Section 2.2 develops the hypotheses based on existing theories. Section 2.3 describes how I constructed the data sample. Section 2.4 details the identification strategy. Section 2.5 describes the main results of the paper. Section 2.6 subjects the results to robustness tests and discusses several extensions. Section 3.6 discusses the results in the context of recent policy developments. Section 2.8 concludes.

2.2 Literature and hypotheses

In this section I review the literature on the effects of taxation on capital structure and develop my hypotheses. When I refer to a multinational company, I mean a corporate group consisting of separate legal entities in at least two countries.

2.2.1 Literature overview

Capital structure is irrelevant in a frictionless world (Modigliani and Miller, 1958), but when we introduce corporate tax rates into the story this changes (Modigliani and Miller, 1963). The introduction of bankruptcy costs into the framework led to the trade-off theory (Kraus and Litzenberger, 1973) which suggests that the benefits of debt, in the form of a tax shield, are traded off against the costs of debt, in the form of bankruptcy costs. Several other factors have been shown to be a cost of debt that can be strong enough to balance the benefits: personal taxes (Miller, 1977), agency costs (Jensen and Meckling, 1976; Huizinga et al., 2008), financial flexibility (Li, Whited and Wu, 2016). However, very little has changed in the overall message: in most countries payments on debt are tax deductible while payments on equity are not.[1] This benefit of debt over equity will result in the company taking on more debt to lower the tax bill.

Many empirical studies have investigated the effects of corporate taxes on the capital structure of companies. Most of these studies focus on the effects of domestic taxes on domestic leverage. A comprehensive study by Rajan and Zingales (1995) investigated the determinants of leverage and showed a strong positive effect of

[1] A notable exception is the Belgian Notional Interest Deduction described and investigated in great detail by Panier et al. (2012); Kestens et al. (2012); Campenhoutvan Campenhout and van Caneghem (2013).

taxes on leverage. Some more recent examples include Faccio and Xu (2015) who use changes in corporate tax rates as natural experiments, Faulkender and Smith (2014) who show the trade-off theory also holds for multinationals and Heider and Ljungqvist (2015) who show the relation between tax and leverage using staggered corporate tax rate changes across US states. All of these studies show a strong positive relation, in line with trade-off theory. For an overview of the effect of domestic taxes on domestic leverage I refer the reader to Graham (2006).

Multinationals face several tax jurisdictions, which allows them to use differences in these laws to reduce their tax costs. Desai, Foley and Hines (2004) show that multinational firms increase their leverage in response to tax changes and can use internal capital markets if the local credit market is underdeveloped, thereby enabling the use of credit were purely domestic firms might not be able to.

Huizinga et al. (2008) are the first to address debt shifting effects in multinational groups. They show theoretically that multinational groups have an incentive to shift debt from low-tax to high-tax countries to increase the total tax shield of the multinational company. They also provide empirical evidence for their theory using parent-subsidiary pairs operating in two different countries. Luciano and Nicodano (2014) show theoretically that there is another reason why multinationals may have larger tax shields. They argue that within a hierarchical structure like a multinational it is possible for parent companies to provide guarantees for outside debt of subsidiaries. This reduces the bankruptcy probability of a firm in a multinational group compared to that of a stand-alone firm and thereby increases the amount of debt a company can take on. The findings of Huizinga et al. (2008) as well as the predictions of Luciano and Nicodano (2014) suggest that the trade-off theory does not fully describe the effects of tax rates on the capital structure of multinationals.

2.2.2 Predictions

In this section, I derive from existing models of capital structure a set of predictions on how multinational groups react to tax changes. Figure 2.1 provides an example of a multinational corporate group. I refer to the firms that form the multinational group as an entity. The group consists of two 'hierarchical levels'. Level 1, consists of entity A. The entity in level 1 owns the entities in level 2 (entity B and C). The local (or domestic) tax rate is the corporate tax rate in the country the entity is located in. In Figure 2.1 this is the Dutch tax rate for entities A and B, while for entity C this is the Italian tax rate. By foreign tax rate I refer to the corporate tax rate of the countries the entity is not located in, but in which the multinational has a presence. For entities A and B this is the Italian tax rate and for entity C it is the Dutch tax rate. When I refer to the tax rates or leverage of the entire multinational company (entities A, B and C combined) I speak of total tax rates or total leverage.[2]

The first prediction is based on the trade-off theory. Interest paid on debt can be deducted from the taxable income, while payments on equity cannot. This suggests that entities should increase their leverage to benefit from this preferable tax

[2]Note that total leverage is created using the sum of all debt and assets of the multinational. This is not necessarily equal to consolidated leverage as consolidated leverage would exclude internal capital. The data does not allow me to distinguish between internal or external debt.

treatment of debt.[3] The marginal benefit of debt financing is the expected marginal tax rate. The higher the tax rate, the higher the benefit of debt financing. However, there is a cost to high leverage, as it increases both the probability of bankruptcy as the costs in case of a bankruptcy. The optimum leverage ratio is the ratio at which the marginal cost and marginal benefit of debt are equal. For such an optimal ratio to exist the marginal cost has to be increasing in leverage (Kraus and Litzenberger, 1973), or the marginal benefit decreasing in leverage (Graham, 2000), or both.[4] Under these assumptions an increase in taxes leads to an increase in leverage. I call this the "local income effect". This theory should hold for any company, multinational or not.

Prediction 1 - "Local Income Effect": an increase in domestic corporate tax rates leads to an increase in domestic leverage

Prediction 1 suggests that in Figure 2.1, absent any other effects, a Dutch tax change affects entities A and B , while an Italian tax change affects entity C.

The second prediction builds on the fact that multinational companies face several tax rates in different countries. They can make use of the differences in tax rates, by shifting tax deductions and income across countries. The multinational can reduce the total tax bill it faces by shifting tax deductions to countries with high tax rates, as the possible marginal benefit of tax deductions is higher in these countries. So, a multinational can obtain a larger tax benefit from holding debt by shifting the debt from one country to an other country with a higher tax rate (Huizinga et al., 2008). I call this the "substitution effect".

Prediction 2 - "Substitution Effect": an increase in domestic (foreign) corporate tax rates leads to decrease in foreign (domestic) leverage

In Figure 2.1 this means, absent any other effects, a Dutch tax change affecting entity C or an Italian tax change affecting entities A and B.

The substitution effect can only exist if the entities in the multinational corporate group share in each others bankruptcy risk. A stand-alone company would optimize its leverage by setting marginal costs of debt equal to marginal benefits of debt. A multinational can only benefit from shifting debt to more highly taxed companies if the marginal costs can be (partially) shared across entities in the multinational corporate group. As a result, an entity in a multinational corporate group can have higher leverage than a stand-alone firm, when the domestic tax rate it faces is high compared to the other tax rates faced by the multinational. The leverage can also be lower when the domestic tax rate is comparatively low. This implies that when a multinational's leverage is in its global optimum it can be locally suboptimal.

[3]The original implementation of the interest deduction in the US and its subsequent persistence were not the result of strong economic arguments (Bank, 2014), the existence of this different treatment is in itself contentious. Scheuer (2013a,b) provides several arguments why the differential treatment is not necessarily inefficient.

[4]If the marginal benefit is the statutory tax rate this is a constant, the marginal costs has to be increasing in leverage for there to be a solution apart from a corner solution. Alternatively, Graham (2000) suggests that the marginal benefit is decreasing, leading to a similar prediction.

The third prediction builds on Luciano and Nicodano (2014). They argue that within a group of companies the entities can provide guarantees for one another. Guarantees reduce the probability of bankruptcy and thereby increase the optimum level of leverage. In their model Huizinga et al. (2008) assume that the multinational group suffers financial distress as a group only. However, as a result of limited liability, an entity within the GS can go bankrupt without the bankruptcy of the entire multinational company.[5]

When an entity goes bankrupt the other entities will have to pay on any guarantees they provided to the creditors of the bankrupt entity. Furthermore, the equity and debt provided to the bankrupt entity will be lost.[6] These losses can be tax deductible for the entity providing these guarantees or the capital. In Figure 2.1 we can see that entity A has provided equity, debt, and guarantees to entity C. In case of bankruptcy of entity C, company A would lose (part of) the provided capital and would have to make good on guarantees. Entity A could lose the book value of equity worth 10, the debt provided worth 20, and the guarantee. These losses can be tax deductible for company A in the Netherlands. Therefore, the government in the Netherlands shares in the costs of the bankruptcy at a rate equal to the tax rate (At a tax rate of 25%, a bankruptcy with no recovery would lead to a loss for the multinational of 30 instead of 40). This risk sharing reduces the costs associated with the financial distress of an entity, as it is shared with the government. The marginal costs of leverage are reduced by the tax rate faced by entity A, thereby allowing for a higher total leverage of the multinational. I call this the "global income effect".

Entities lower in the hierarchical structure (e.g. entity D in Figure 2.1) will hold no equity in, and likely provide less debt and guarantees to other entities in the structure than companies high in the structure (e.g. entity A in Figure 2.1) (Kolasinski, 2009; Bianco and Nicodano, 2006).[7] Moreover, even if the entity lower down in the hierarchy provides capital to its parent, the bankruptcy of the parent would take down the subsidiary as well. Cullen and Gordon (2007) argues that companies share their risk with the government through the corporate tax rate. I argue that they not only share their own risk, they also share the risk on the capital and guarantees they provide to their subsidiaries. The global income effect is increasing in the amount of capital and guarantees provided, as well as the marginal tax rate faced by the entity providing the capital, the global income effect has a larger impact for entities higher up in the hierarchical structure of the multinational facing a higher tax rate. This implies there is a direct effect of the multinational's group structure on the tax benefits of debt.

Prediction 3 - "Global Income Effect": a local increase in corporate tax rates results in an increase in total leverage, beyond that of predictions 1. The effect is weaker if the tax rate increase is suffered by entities lower in the hierarchical struc-

[5]While the substitution effect relies on bankruptcy costs being shared across entities within the GS, limited liability implies that the entities still face a risk of bankruptcy, separate from the bankruptcy risk of the multinational as a whole.

[6]Desai et al. (2004) show that debt from parents can be 20% of all debt in a subsidiary.

[7]For instance, in the corporate bonds market about one out of every three bonds issued by a subsidiary is guaranteed by the parent company (Kolasinski, 2009).

ture

In Figure 2.1 this would mean that an increase in the Dutch tax rate, as faced by entity A leads to a larger increase of the total leverage of the multinational, than an equal increase in the Italian tax rate, as faced by entity C. This is the result of the fact that entity A is higher in the hierarchical structure and therefore more likely to provide equity, debt, and guarantees (Kolasinski, 2009; Bianco and Nicodano, 2006). Risk of losses on this equity, debt, and guarantees is shared with the government, reducing total bankruptcy costs. An increase in the tax rate increases the percentage of the risk shared with the government.

The global income effect does not specify which entity will be allocated the additional leverage, only that the total leverage of the multinational increases. Since the multinational tries to optimize its capital structure, it allocates the additional debt capacity to the entity where the net-benefit is the largest.

Corollary 1: a domestic tax decrease leads to a negative local income effect, a negative substitution effect and a non-positive global income effect. The overall effect of a domestic corporate tax rate decrease on domestic leverage is negative.

Due to the countervailing forces of the substitution and income effects the outcome of a foreign tax decrease is ex-ante not clearly signed. Therefore, we should ask the question of under what circumstances which of the three effects dominates.

Corollary 2: a foreign tax rate decrease leads to a positive substitution effect and a non-positive global income effect. The overall effect of a foreign corporate tax rate decrease on domestic leverage is ex-ante ambiguous.

While the local income effect and substitution effect have been shown before, I can show under what conditions the Kraus and Litzenberger (1973) and Huizinga et al. (2008) theories predict the right outcomes and when they will not. By showing when the global income effect dominates the substitution effect I can analyze the leverage distribution over the entities in the multinational corporate structure. This not only allows me to analyze leverage for the whole multinational, but also provide direct evidence for the effects of the corporate group structure itself on leverage.

2.3 Data

2.3.1 Tax data

Information on tax rates and tax base changes are hand-collected from Ernst & Young's "World Wide Corporate Tax Guides". Ernst & Young is a major accounting and advisory firm that creates summaries of the world wide tax systems on a yearly basis. All major changes are captured in these tax guides.

There are several ways of calculating and defining the corporate tax rates that can be used in research. I use the top statutory corporate tax rate. The tax benefit is gained over the next euro earned rather than the average euro earned, hence this

marginal tax rate is the appropriate tax rate to use.[8] When looking at the effects of foreign taxes the tax rates are weighted by the multinational's sales in each country. This makes the tax rates faced unique to each multinational, rather than just being a unique annual country level tax rate.

A bias would arise if companies have beneficial agreements or constructions in place which allow them to pay taxes at rates below the marginal tax rate (e.g. company specific 'tax holidays'). The underlying assumption in all research about tax effects on leverage, is that most companies do not have such arrangements. If these arrangements are prevalent, I should not find an effect of taxes, as the entity is not affected by changes in tax rates. It would bias against finding a result. Therefore, I do not further investigate the existence of tax arrangements.

2.3.2 Firm level data

One of the challenges in investigating the effects of corporate taxes on multinationals is the fact that most databases provide a consolidated account for the whole multinational. This makes it impossible to determine the tax regimes the multinational faces. I create a dataset which maps all the entities of the entire corporate structure of a multinational. I create the dataset using the Bureau van Dijk Orbis database.[9] Kalemli-Ozcan et al. (2015) provide an overview of the representativeness of the ORBIS database. The sample available in Orbis is dependent on reporting requirements in different countries. To ensure this does not affect my results I look at the presence of entities in my data, relative to the size of the economy of a country. In robustness tests I exclude those countries that are relatively over- or under-represented.

Orbis is continuously updated, but the majority of the data is only updated within a year of company filings and large parts are only updated after three or more years. Orbis provides information about ownership links at the moment of download, while accounting information can be obtained for the past ten years. To obtain ownership information at different points in time I use the historical databases. These include snapshots of the data at a particular point in time commonly referred to as vintages. The ownership data I use is the beginning of year ownership structure, obtained yearly from the respective vintage. Orbis provides wide coverage on ownership, with over 845 million ownership links. I only include entities from the European Economic Area (Austria, Belgium, Bulgaria, Czech Republic, Germany, Denmark, Estonia, Spain, Finland, France, United Kingdom, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Latvia, Netherlands, Norway, Poland, Portugal, Romania, Sweden, Slovenia, Slovakia). This ensures the entities face a similar economic environment. An added benefit is that within the European Union there are harmonized regulations on withholding taxes, on interest, and dividends.

The accounting data is obtained from the 2008, 2012 and 2015 vintages. Each of these provides data for the previous ten years. Only the most recent data is kept.

[8] See Devereux and Griffith (1998) for a more extensive discussion of what tax rate to use in analyzing corporate decisions.

[9] For more details about the Orbis database see: Kalemli-Ozcan et al. (2015). I make the suggested corrections, as well as several additional corrections for idiosyncrasies the authors were not faced with for their purposes.

Data consistency and availability greatly improved after 2004, so my sample starts in 2005 and runs until 2011.

For each firm I can observe the list of European subsidiaries and all shareholders. To obtain the entire structure of the multinationals I link each top holding company to its set of European subsidiaries. These subsidiaries are then linked to their own subsidiaries.[10] I repeat this process up to six hierarchical levels deep. I put no restriction on the minimum ownership percentage as Orbis does not consistently report these percentages for many entities. The availability of this information is increasing in the size of the entities. Using it to filter entities with smaller or unknown shareholdings would create a bias towards larger firms. The bias created by including entities which are only partially held works against finding a result. A multinational is unlikely to shift debt to an entity in which it only holds a minority stake, as they only partially reap the benefits. Lack of computational power makes it hard to expand the data beyond 6 levels.

The information is then aggregated at the multinational-country level, creating one yearly observation for each multinational per country it is active in. This is done because the corporate structures of some multinationals are vast and using for instance a multinational-entity level observation would mean that larger multinationals could become a substantial part of the sample. A large multinational can contain hundreds of entities, while a small one only contains a handful.[11] Moreover, if a company would utilize fiscal consolidation I would not necessarily expect an effect for each entity in a country, as they are treated as one entity for tax purposes. Aggregating the data ensures that, if my predictions are correct, and regardless of fiscal consolidation, firms respond to the tax incentives. For a more detailed discussion on the construction of the unit of observation see appendix A.

The dataset allows me to determine in which countries a multinational company operates. Each multinational-year observation includes information of the multinational at the country level for up to a maximum of 26 countries. Since I am interested in the reaction of domestic leverage to changes in both domestic and foreign taxes, each of these multinational-country-year observations is included as a separate observation. It means that in the case of Figure 2.1 the multinational company is once included as observation 1 Italy and once as observation 1 Netherlands. Observation 1 Italy consists of the data of Entity C, while observation 1 Netherlands consists of the aggregated data of Entity A and Entity B. This allows me to see how the Dutch entities react to Dutch and Italian taxes, but at the same time how the Italian entity reacts to Italian and Dutch taxes. Despite the aggregation I can still see whether a

[10] In constructing the data I first made several corrections. The most important correction is a cross validation of information. When entity A is the shareholder of entity B, entity B by definition has to be the subsidiary of entity A. This is verified and corrected when necessary. This discrepancy is the result of different reporting requirements across countries. On top of that, some countries require more disclosure on subsidiaries than on shareholders or vice versa.

[11] Note that (fiscal) consolidation is not an issue. All accounting information comes from unconsolidated statements. Fiscal consolidation is only allowed within a country. This would lead to a similar aggregation as the one I employ. Purely domestic inter-company transactions are irrelevant as they would either be taxed and deductible at the same rate (if no consolidation) or not taxed at all (if consolidation). This eliminates the effect of guarantees in a purely domestic setting. However, I can still observe it internationally. This makes the estimated global income effect a lower bound to the actual effect.

multinational company sets-up additional entities in the country or expands into a new country.

Accounting data is winsorized at the 1% level to ensure results are not driven by outliers. Observations with missing leverage, tangible fixed assets, sales, EBIT, total assets or non-equity liabilities are dropped from the sample. These variables are used to construct the dependent and independent variables.[12] Only multinational groups with accounting information in at least two countries are kept in the database. If a multinational company is present in three countries, but only one country provides accounting information, it is not included in the database (this drops 711 multinational-country-year observations). The final sample includes 43,724 multinational-country-year observations of 12,178 multinational-years from 26 countries.[13]

2.3.3 Summary statistics

Panel A of Table 2.1 provides information on the observations per year, number of countries for a given multinational company and the country distribution of the sample. The largest multinational company is present in 26 countries. Most multinationals (70%) are only present in two or three countries. Note that two-country multinationals can still consist of many firms, as can be seen in Figure 2.1.[14]

Panel B of Table 2.1 shows the location of holding companies and total entities. Total entities are the total number of multinational-country-year observations for which accounting information is available, while holding companies indicates the location of the holding company, regardless of availability of accounting information. Eastern European countries have relatively few holding companies compared to total entities. Some countries like Germany seem underrepresented compared to a country of similar size like Spain. Spain and the United Kingdom make up a substantial part of the data, I ensure this does not drive the results. This can be due to the fact that multinationals don't establish in some countries or differences in reporting requirements which leads to missing information. For this paper, it is important to rule out that the potentially missing information is not systematically related to tax induced location choice. In order to ensure endogenous location choice does not drive my results I exclude entities incorporating during the sample period in a robustness test. Furthermore, in a robustness test I exclude countries that are over-

[12]There is accounting data missing for some entities of the multinational. These missing entities cannot be included in the data. This can create a bias as leverage may be shifted towards entities I do not observe. This will create noise in the data, making it harder to obtain significant results. For it to cause my results there should be consistent non-reporting of entities across 26 countries, in such a way that those who do not shift debt are excluded from the sample. Furthermore, the factor causing such a bias must not be captured by the controls or fixed effects. No such obvious mechanism comes to mind.

[13]The sample contains the EU-28 minus Malta, Croatia and Cyprus as none of the multinationals show accounting data in these countries. Norway, as part of the European Economic Area (EEA) is included in the sample as many of the benefits and rules of the EU are also extended to the EEA.

[14]Of the multinationals present in only two countries the vast majority has entities at multiple levels in these countries. 24% has only one level in a country, they could still consist of multiple entities at that level.

or under-represented relative to the countries economic size.

Panel A of Table 2.2 shows the summary statistics for the multinational-country-year-level data. Leverage is defined as all non-equity liabilities over total assets.[15] The average leverage is 0.539. The minimum leverage is close to zero, while the maximum is close to being a fully levered entity. My values are comparable to those in Huizinga et al. (2008) and Rajan and Zingales (1995), who use the same definition of leverage. Faccio and Xu (2015) find a lower value, but use a narrower definition of leverage. My results are robust to using a definition which only includes interest bearing debt.

Both depreciation and tangibility are skewed to the right. This suggests that on average the entities have low intangible assets. Sales show significant variation across entities, as one would expect. A substantial fraction of the entities has negative return on assets. Negative returns can lead to a company not having to pay any taxes. When the company does not pay taxes, it cannot benefit from the tax-shield created by debt. However, the leverage decision has to be made before profits for the year are known. Therefore, the multinational uses expected profits, not actual profits to determine the use of leverage. Furthermore, tax and accounting profits can differ significantly and most countries in the sample have generous tax loss carry-over options. Therefore, the companies with negative returns are kept in the sample. This could bias against finding a result, but uses all available information.

Panel B of Table 2.2 shows the correlations between the main variables. In Figure 2.2 the correlation between tax and leverage is graphically represented. The graph shows a high degree of correlation between leverage and tax. It also shows a consistent decline in corporate income tax rates over time. Tangibility shows the expected positive correlation with leverage. The drop in leverage seen in Figure 2.2 is not caused by the economic downturn as I adjust leverage for trends in the macroeconomic controls, by using the residual of a regression of leverage on macro variables. Table 2.3 shows the country by country breakdown of taxes and leverage. It shows suggestive evidence that countries with higher tax rates also have higher leverage. It also shows the amount of tax changes that occurred in each country. Figure 2.4 shows the tax rates for each country over time.

2.4 Methodology

2.4.1 Identification

Before establishing the existence of the global income effect it is important to ensure that my dataset replicates the results from the previous literature. Doing so provides a 'sanity check' for the data. I test Prediction 1 using the same methodology previously used in the literature (Faccio and Xu, 2015; Rajan and Zingales, 1995;

[15]The variables required to construct this measure are consistently defined and reported across countries. Information on provisions is limited. Only Germany and Norway consistently present data on this. In 16 of the 26 countries the difference between excluding or including the provisions in the definition will lead to less than 1% difference in the numerator. While in the other 10 the difference is sizable. This is driven by reporting requirements and labeling. Excluding provisions is therefore likely to create a bigger bias than including them.

Heider and Ljungqvist, 2015; Faulkender and Smith, 2014).

$$Leverage_{ict} = \beta_1 Tax_{ct} + \beta_2 X_{ict} + \beta_3 Z_{ct} + \gamma_t + \zeta_{ic} + \epsilon_{ict} \tag{2.1}$$

Where i indicates the multinational, c the country and t time. The main variable of interest is the statutory tax rate. X is a vector of entity-level controls, based on prior work by Rajan and Zingales (1995) and Huizinga et al. (2008). They include tangibility, profitability, sales, and depreciation. Z contains the country-level controls, GDP-growth and interest rates. Table 2.19 shows the definitions of the variables used in the rest of the paper. I include a year and a multinational-country fixed effect. These control for year-specific Europe-wide factors and entity-specific time-invariant unobserved heterogeneity. Throughout, I cluster standard errors at the multinational level, as the multinational company makes a decision for the whole multinational company, based on the tax rates it faces. Tax changes occur at the country level, which would make this a logical level to cluster at as well. In additional tests I cluster by the countries the multinational is present in. I also cluster on industry-country levels in additional tests.

I also estimate this equation in first differences to investigate whether changes in tax rates lead to changes in leverage. The first difference equation includes a fixed effect for years to capture any changes common for all entities in a specific time. I also include a multinational-country fixed effect, this captures any linear trend in leverage growth of a multinational-country.

Equation 2.1 only tests the local income effect, which suggests that when the domestic tax rate decreases the firm decreases its leverage. However, the substitution effect suggests that the firm will additionally substitute leverage from the domestic entity to foreign entities in the multinational corporate group. In Equation 2.1 part of this effect will be captured by β_1. Therefore, in the presence of the substitution effect the estimate of β_1 is likely biased upwards. This suggests that it is important to test Predictions 1 and 2 simultaneously.

To test Predictions 1 and 2, I use a methodology similar to that of Huizinga et al. (2008). However, I need to adjust the methodology to fit the differences in the data. Huizinga et al. (2008) used parent-subsidiary pairs, which allowed them to compare the domestic tax rate to the foreign tax rate. In my dataset I look at the entire corporate structure. Therefore, I need to compare the domestic tax rate, not to one foreign tax rate, but to all foreign tax rates the multinational company faces. I estimate the following regression:

$$Leverage_{ict} = \beta_1 Tax_{ct} + \beta_2 Tax\ difference_{ict} + \beta_3 X_{ict} + \beta_4 Z_{ct} + \gamma_t + \zeta_{ic} + \epsilon_{ict} \tag{2.2}$$

Where $Tax\ difference_{ict} = Tax_{ct} - \sum_{k \neq c}^{C} \frac{Sales_{ikt}}{\text{Total sales}_{it}} Tax_{ikt}$ measures the tax difference between the domestic and weighted foreign tax rates (Huizinga et al., 2008). In an alternative specification I take the difference between the weighted domestic and weighted foreign tax rates. The results are qualitatively similar.

Equation 2.2 does not test the global income effect. Corollary 2 shows that the global income effect can work in the opposite direction to the substitution effect in the case of a foreign tax change. Corollary 1 shows that the global income effect works in the same direction as the local income effect and substitution effect in case of a domestic tax change. This suggests that the coefficients in Equation 2.2 can be biased upwards and downwards.

Prediction 3 states that a decrease in the tax rate in a country should have an impact on the total leverage of the multinational company, beyond that of Prediction 1.

$$Leverage_{it} = \beta_1 Total\ tax\ rate_{it} + \beta_2 X_{it} + \beta_3 Z_{ct} + \gamma_t + \zeta_i + \epsilon_{it} \tag{2.3}$$

Equation 2.3 will test the effect of a change in the total tax rate on the total leverage of the multinational company. However, β_1 will capture both the effect of Prediction 1 and Prediction 3. To test the existence of Prediction 3 I make use of the second part of that prediction: "The effect is weaker if the tax rate increase is suffered by entities lower in the hierarchical structure". This implies that a tax rate decrease suffered by the entities high in the multinationals hierarchical structure will have a stronger impact than tax rate decreases suffered lower down in the structure (Going back to Figure 3.1(b), a tax rate decrease in the Netherlands carries a larger global income effect than a tax rate decrease in Italy). I estimate the following regression:

$$Leverage_{it} = \beta_1 Top\ levels\ tax\ rate_{it} + \beta_2 Total\ tax\ rate_{it} + \beta_3 X_{it} + \beta_4 Z_{ct} + \gamma_t + \zeta_i + \epsilon_{it} \tag{2.4}$$

Where the 'Top levels tax rate' is weighted average tax rate of the entities high in the hierarchical structure of the multinational.

Because the unit of measurement in my data is a multinational-country-year observation, it can contain multiple entities which can be present at multiple levels. In Figure 3.1(b) the multinational company is present in Italy at both the second and third level, while in the Netherlands it is present on the first and second levels. To define the top levels I use the highest hierarchical level the multinational-country-year observation is present at. So in Figure 3.1(b) Italy would be at the second level and the Netherlands at the first level. While the multinational company has three levels, no multinational-country-year observation is deemed to be a level three observation. For an observation to be at the 'top level' I determine if the highest level is smaller than the average level for the multinational company (in the case of Figure 3.1(b) (1+2+2+3)/4=2). So the Netherlands was a first level observation, which is smaller than the average level of 2. Therefore it is a 'Top level' observation. Similar results are obtained if the lowest level in a country is used, or if I compare to the median.

Corollary 2 provides a second way of testing Prediction 3. A foreign tax rate increase leads to a decrease in domestic leverage as a result of the substitution effect.

The global income effect can increase total leverage capacity of the multinational, thereby increasing domestic leverage. These two counteracting predictions allow me to isolate the global income and substitution effects. An increase in foreign tax rates leads to a decrease in domestic leverage, which I can capture using the Tax difference from Equation 2.2. However, if the foreign tax increase occurs at a 'top level' there is a simultaneous increase in domestic leverage. I can capture this using the weighted foreign tax rate of the 'top level' entities. I estimate the following regression:

$$\begin{aligned}\text{Leverage}_{ict} = \beta_1 \textit{Top levels tax rate}_{i-ct} + \beta_2 \textit{Tax difference}_{i-ct} + \beta 3 \textit{Tax rate}_{ict} \\ + \beta_4 X_{it} + \beta_5 Z_{ct} + \gamma_t + \zeta_i + \epsilon_{it}\end{aligned} \tag{2.5}$$

Note that ideally speaking one would include the tax rates for each of the 6 levels separately. However, due to the large amount of firms having only 2 or 3 levels the amount of zeros at the lower levels will make the rates for these lower levels strongly collinear.

2.4.2 Endogeneity and measurement

Reverse causality

A potential concern for my identification strategy is reverse causality: this suggests that tax rates change as a result of leverage ratios of companies. The argument is that governments, facing lower income as a result of leverage-based tax avoidance, increase tax rates to maintain steady income. However, while government's tax revenue has decreased during the crisis, most countries reduced their tax rates during this period. The relation between government revenue shortfalls and tax rate changes is not positive, let alone dependent on the leverage of firms in the way the reverse causality argument suggests it would be.

Furthermore, the following argument can alleviate the reverse causality concern. A government facing a drop in income as a result of tax avoidance using debt shields does not fully benefit from increasing tax rates, as companies would increase the debt shield accordingly to counteract the higher taxes. This will push bankruptcy risk up. Alternatively, countries could limit the deductibility of interest by using thin-capitalization rules or so called earnings stripping rules, reducing the problem without affecting bankruptcy risks. This is the solution suggested by the OECD (2014). I test for the impact of these rules.

To ensure that there is no third factor driving both leverage and taxes through an overall economic downturn I control for several firm and macro-level controls for the economic environment. Furthermore, I use cross-sectional tests to ensure the within country variation is in line with what taxes would predict.

While I see no tax rate increases, such as a reverse causality argument would require, one could expect a tax race to the bottom. This would imply that a foreign country lowers its tax rate, thereby creating an expectation that the domestic country will do the same. The leverage in the domestic country responds to this

expectation, rather than the actual foreign tax change. Even if we would ignore the fact that there is no benefit in responding to a tax change until it has actually occurred, the substitution effect suggests the exact opposite should occur. The global income effect suggests that the effect differs dependent on where in the hierarchy of the multinational an expectation is created. Neither of these are in line with a story based on a tax race to the bottom. Moreover, it is hard to argue that the tax race to the bottom is driven by leverage.

The fact that multinationals are different in how much of their business is exposed to different tax regimes and at what hierarchical levels can also alleviate concerns about investment opportunities driving both leverage and taxes. Keeping the exposure at the initial level can rule out endogeneous updating of the exposure, suggesting that for a third factor to drive both tax rate changes and leverage, it has to predictably vary with the initial level of exposure across countries and hierarchical levels. To further reduce the risk that this is the case I will use cross-sectional tests to show that the found effects vary predictably along cross-sectional lines.

Location selection bias

A second concern may arise because multinational groups might simultaneously decide on location and the leverage they take up in the country. The location choice may depend on tax rates, which would create a bias (Faulkender and Smith, 2014). The problem can be mitigated by estimating all equations in first differences. The change in leverage as a result of changing taxes cannot be influenced by the initial location choice. I conduct further robustness tests in Section 2.6.2. I test whether the observed effects are robust to using the initial weights, rather than the yearly updated weights. This ensures that shifts in the weights due to entry do not affect the results.

Variable weighting

Foreign variables are a weighted average of all the foreign entities of the multinational company. Weighting is necessary as a smaller presence in a country might cause weaker reactions to a tax change than a larger presence. The weighting variable should proxy for the taxable base. Gross profit seems like a good candidate. However, profit can be negative, creating a negative weight. Negative weights are hard to interpret in the context of this paper.

Huizinga et al. (2008) use total assets as their weighting variable, as this follows from their theory. Total assets does not proxy for the size of the taxable base. On top of that, the dependent variable is leverage, which is defined as debt over total assets. Weighting the independent variables by total assets could create a mechanical correlation. So while theoretically total assets would be a logical variable to weight by, econometrically this could bias in favor of finding a result. In a robustness test I test whether weighting by total assets affects my results.

Faulkender and Smith (2014) use sales. Sales, though a crude proxy, is indicative of actual taxable activities in a country. Moreover, it is always positive and does not suffer from any of the problems with creating artificial correlation between the dependent and independent variables. Throughout this paper I use sales as the

weighting variable.

2.5 Results

2.5.1 Global income effect and dominance of the effects

To investigate the global income effect it is important to understand what drives the global income effect. A higher tax rate faced higher in the hierarchy increases the portion of the subsidiary related financial risk shared with the government. However, higher domestic taxes already imply an increase as a result of the local income effect. This makes it hard to distinguish these affects. Using a foreign tax rate faced higher in the hierarchy overcomes this problem, as the substitution effect and global income effects predict opposite directional effects. This also provides the opportunity to investigate when, if ever, the global income effect dominates the substitution effect. This will shed light on the interaction between the various effects and provide heterogeneous policy implications.

In column 1 and 2 of Table 2.4 I test the effect of the GS on leverage. It can be seen that the foreign tax rates faced high in the GS have an additional positive effect on leverage, while column 2 shows that the foreign tax rates faced low in the GS have no additional effect. The effect suggests that for a multinational like the one in Figure 2.1 the Italian subsidiary being faced with a Dutch tax decrease of 5% will face an increase in domestic leverage of 0.3% on the basis of the substitution effect, but a domestic leverage decrease of 0.11% based on the global income effect. Ignoring this effect means that we overestimate the increase in domestic leverage by 50%.

However, these are average effects. It is important to remember that the additional capacity to hold debt created by the global income effect can be allocated to any entity in the GS. It is hard to make a prediction on which entities in the structure should benefit more. In columns 3 through 5 I test several predictions based on Graham (2000). The author suggests that the marginal benefit of the tax-shield does not only depend on the tax rate, but is decreasing in other tax deductible costs and in the expected tax deductibility of the additional interest.

Therefore, in column 3 I test whether the effect of a foreign tax change high in the hierarchy is stronger if the domestic tax rate is relatively high compared to the other tax rates faced by the multinational. I use the difference between the domestic tax rate and the average tax rate for the multinational. This captures the benefit compared to the alternatives within the same multinational. The results are strongly significant suggesting that the additional debt capacity of the multinational is allocated to those entities that can deduct the interest against the highest tax rate. For firms low in the hierarchy the effect is negative. This suggests that debt is shifted away from mostly the higher tax countries. This could indicate a lack of debt to shift from the low tax countries.

The coefficient suggests that in Figure 2.1 when the Netherlands decreases the tax rate from 25% to 20% and Italy maintains a tax rate of 31% the substitution effect is still the previous increase of 0.3%, while the global income effect predicts

a decrease of 0.024*5%+0.506*5%*(31%-20%)=0.39%. Ignoring the global income effect in this case would lead one to predict an increase rather than a decrease.

Column 5 show the effects of a foreign tax change on domestic leverage for entities with higher profitability compared to less-profitable ones in the same multinational. We can see that the additional debt capacity of the global income effect is used in more profitable entities. This makes sense as these are the entities which can deduct the interest from taxed profits. These results also hold if I interact with the continuous variable profitability.

The coefficient suggests that in Figure 2.1 when the Netherlands decreases the tax rate by 5% and the Italian entity is profitable, the substitution effect is still the previous increase of 0.3%, while the global income effect predicts a decrease of 0.013*5%+0.167*5%=0.9%. Ignoring the global income effect in this case would lead one to predict an increase rather than a decrease.

Column 7 test whether the effect are different for entities with higher non-debt tax shields like depreciation. To ensure that the size of the multinationals does not affect the estimation I standardize the depreciation. I take an entity's depreciation and subtract the average depreciation for that multinational-year and divide by the standard deviation of depreciation for that multinational-year. This ensures that I capture the effect of being an entity with high non-debt tax shields, compared to the alternatives within the same multinational group. Those entities with relatively higher depreciation get allocated less of the additional debt capacity. This is in line with expectations, as these entities have other debt shields to reduce their tax bill. Again, we see no differences when we do not expect a global income effect (after a low level tax rate change).

The coefficient suggests that in Figure 2.1 when the Netherlands decreases the tax rate by 5% and the standardized depreciation is 50% higher, the substitution effect is still the previous increase of 0.3%, while the global income effect predicts a decrease of 0.029*5%-0.04*5%*0.5=0.05%. Ignoring the global income effect in this case would lead one to predict an effect 20% larger than it actually is.

These results are consistent with the multinational allocating additional debt to the subsidiaries that gain the most benefit from them. It also shows that both on average, but especially for those most affected, the global income effect has a substantial impact on the leverage of multinational companies.

2.5.2 Total leverage effects

The results from Table 2.4 suggest that there is indeed a global income effect. To further test the existence of the global income effect I show that the total leverage of a multinational is affected by changes in tax rates.

First I test Equation 2.3. Columns 1 and 2 of Table 2.5 show that the total leverage of a multinational as a whole is affected by the weighted average of the tax rates faced by the multinational company. A strong positive coefficient on the tax rate is observed in both levels and first differences. A one standard deviation decrease in total taxes leads to a 0.072 decrease in total leverage. Tangibility is not a significant determinant of total leverage, but all other control variables show similar directions to those found for the separate entities.

This result does not prove the existence of the global income effect. The global income effect suggests a decrease in the total leverage beyond that of the sum of the local income effects of all entities in the multinational. To show the global income effect I need to investigate whether the effect is smaller for tax changes at the entities lower in the hierarchy of the GS.

To show that this is the case further tests on the global income effect are shown in columns 3 and 4. I include the weighted tax rates of the entities at the bottom of the hierarchy in the regression as these are the entities least likely to provide internal capital. The expectation is that the bottom level tax rates have a smaller, possibly negative effect on total leverage. This is exactly what I find. The trade-off theory does not predict a different effect of the tax rates at the bottom level on the leverage of the multinational.

2.6 Extensions and robustness

In this section I discuss several extensions and robustness tests.

2.6.1 Local leverage effects

I verify that without the global income effect the data still shows similar patterns as the data used in previous studies.

The first prediction in the literature is the existence of the local income effect (Kraus and Litzenberger, 1973; Rajan and Zingales, 1995; Heider and Ljungqvist, 2015) using Equation 2.1. Columns 1 and 2 of Table 2.6 show the results. Consistent with the previous literature tangibility and sales show a positive relation with leverage, suggesting that size and the available collateral positively affect leverage. Profitability and depreciation are negatively related to leverage. Depreciation is known as an important non-debt tax shield and is argued to be a substitute for the use of leverage (DeAngelo and Masulis, 1980). GDP growth has very little effect on the leverage of companies, while the interest has an unsurprising negative effect on leverage. These patterns are in line with expectations based on the previous literature (Rajan and Zingales, 1995).

The coefficient on the domestic tax rate implies that a one standard deviation decrease in the corporate tax rate leads to a 0.026 decrease in leverage. This is comparable to the effect in Huizinga et al. (2008) and Faccio and Xu (2015). The tax rate is a strong determinant of leverage, its strength is comparable to that of profitability. A one standard deviation increase in profitability leads to a 0.030 decrease in leverage. The regression explain 77% of the variation in leverage, which is in line with Faccio and Xu (2015). Year and multinational-country fixed effects are highly significant and explain most of the variation. This is in line with the previous literature.

Column 2 shows that these results also hold in first differences, which implies that changes in tax rates have a similar effect to level differences in tax rates. The results in the first two columns provide strong evidence for the trade-off theory effect of taxes and provide a baseline for the rest of the paper.

The second prediction in the literature is the existence of the substitution effect (Huizinga et al., 2008). In columns 3 and 4 of Table 2.6 I test for this effect using a methodology similar to that of Huizinga et al. (2008). I use what Huizinga et al. (2008) call the incentive to shift debt, defined as the difference between the domestic and the weighted foreign tax rates ($Tax\ difference_{ict} = Tax_{ct} - \sum_{k \neq c}^{C} \frac{Sales_{ikt}}{\text{Total sales}_{it}} Tax_{ikt}$). When this variable takes a higher value the domestic tax rate is higher relative to the foreign tax rates. This creates an incentive to shift debt towards the domestic entity.

I also include the weighted foreign control variables. It can be seen that the domestic control variables take qualitatively and quantitatively similar values to those of the local income effect regressions. The foreign control variables take the expected opposite signs, but most are not significant. It shows that when interest rates faced by foreign entities are higher the multinational is more likely to take up leverage in the domestic country. Similarly, larger foreign entities means that less leverage is taken up domestically.

Similar to Huizinga et al. (2008) I find an effect of the incentive to shift debt on leverage. However, the effect is considerably weaker. The result is very weak in first differences. This could imply that endogeneous entry has a substantial role in this result. In further tests I rule out that endogeneous entry drives the results.

2.6.2 Incorporation

One of the main concerns is that companies incorporate in countries with high tax rates to use their debt structure more efficiently. I provided logical arguments against this and have shown that the results also hold for first differences. First differences are arguably not affected by the concern as the change is not taken into account at the moment of incorporation. An argument can be made that introducing new subsidiaries in a country that one is already established in can be part of a larger strategy of shifting debt to that country. To ensure the results are not driven by endogeneous entry or expansion I follow Faulkender and Smith (2014) and use the initial level of the sales contribution of the entity to the total company to ensure the location choice is not endogenous. This also rules out scenarios where my effects are driven by companies shifting their profits at the same time. Table 2.9 shows the results are qualitatively unchanged.

2.6.3 Coinsurance

Lewellen (1970) posits an effect similar to that of Nicodano and Regis (2018). However, in his theory the effect is driven by coinsurance in conglomerates. While this theory cannot provide a rational for the reaction to the tax rate, I will test whether this effect is present in the data and overlaps with my effect. I include the Herfindahl-index for the concentration of a groups entities to a specific industry. I also interact the high and low hierarchy tax rates with the HHI.

2.6.4 Tax base changes

A problem pointed out by Kawano and Slemrod (2012) is that many changes in tax rates are associated with changes in the tax base, which can bias results. A decrease in tax rates could be accompanied by a broadening of the tax base. This limits the effects of a tax change on a governments income. More importantly, such a change would mean that companies don't benefit from a decrease in taxes. This is contrary to the predictions of classic trade-off theory. Therefore it biases against finding a result.

Ideally speaking I would also explicitly control for so called thin-capitalization rules. These rules put a strict limit on interest deductibility, which likely affects the effect of tax changes on high-leverage companies. One could include dummies, a count variable or a weighted count variable to take into account the existence of thin-capitalization in multiple countries. However, country dummies will be subsumed by the entity fixed effects already included. Ignoring these rules would result in underestimating any result as the rules reduce the incentive to act when a tax rate change occurs. I check for large tax changes coinciding with thin-capitalization changes in that country to alleviate concerns related to thin-capitalization rules. I find that Germany changed its thin-capitalization rules and concurrently decreased its tax rate by 10%. Therefore, I formally test if omitting multinational-country-year observations after the change of a thin-capitalization rule changes my results. By excluding observations after a change I ensure that the effect of thincap regulations before the change will be captured by the fixed effects. The excluded countries are Belgium after the 2006 introduction of the Notional Interest Deduction; Denmark and France after their changes to the Thin-capitalization rules in 2007; Italy, Bulgaria and Germany after the change to their Thin-capitalization rules in 2008; Slovenia is excluded for multiple changes to its Thin-capitalization rules; and Greece and the United Kingdom after the introduction of new Thin-capitalization rules in 2010. In Table 2.10 we can see that the results are unchanged. Additionally, since thin capitalization regulations limit interest deductibility it could affect what countries get allocated the additional debt capacity created by the global income effect. I create an interaction with stringency of thin capitalization rules and find that indeed the effect is weaker in countries with thin capitalization rules that allow for a maximum of 3:1 (which is approximately equal to the average leverage ratio + 1 standard deviation) or lower debt-to-equity ratios.

Secondly, I test for the effect of so called Controlled Foreign Company rules. These limit the benefit of using passive income (like interest) to reduce the tax bill. If a low tax subsidiary lends to its high tax parent under such a rule then the parent country will impose an additional tax on the passive income (the interest) at the parent tax rate. However, in 2006 a case known as the Cadbury-Schweppes ruling of the European Court of Justice (European Court of Justice, 2006) deemed these CFC-rules in violation of the right of free establishment within the EU. To make sure these rules and the change do not drive the results I exclude multinational-country-years that could have been affected by these rules. The results are qualitatively unchanged (Table 2.12).

2.6.5 Agglomeration

The countries in which holdings are situated might differ from those where bottom level subsidiaries are situated. The channel could be that the firms in high-tax countries are substantially different for other reasons than taxes.

Baldwin and Krugman (2004) show that countries considered to be core countries can charge higher tax rates than countries in the periphery without losing capital. Many of the high-tax countries are also core countries Chase-Dunn et al. (2000); Wallerstein (1976). This is also supported by evidence in panel B of Table 2.1, which shows that most holding companies are located in core countries. The companies higher in the hierarchy are also those in core countries. If core countries have a stronger reaction to domestic tax changes the results in Table 2.4 could also be explained by this effect. The fact that core countries don't lose their ability to attract capital as a result of high tax rates can lead to two contrary predictions. On the one hand companies could offset the higher tax rate with higher debt, making the core-periphery decision tax neutral. Alternatively the benefits of being located in a core country could simply outweigh the costs and the entity is willing to pay this premium.

To my knowledge the effect of agglomeration on leverage has never been tested. Therefore, I test the effect and run regressions similar to those in Table 2.6, but I include an interaction between the tax rate and a dummy for core countries. Core countries are defined using lists from Chase-Dunn et al. (2000) and Wallerstein (1976). Regardless of the definition I use, I find a negative effect. This suggests core countries respond less to a domestic tax change. Companies are less reactive in core countries suggesting there are other benefits in these countries that outweigh the cost. However, for it to explain my results I would require the opposite sign to be observed, as companies in core countries would have to react more strongly. Similarly I run the effects of Table 2.4 with the interaction, the results are not affected (Table 2.8).

2.6.6 Leverage definition

I run a test using a definition of leverage that uses just interest carrying debt. I can then also make a split in companies with high and low trade credit. Trade credit does not affect the benefit of using tax shields, but does increase the bankruptcy probability. Multinationals with trade credit low in their structure have a higher probability of bankruptcy, this should strengthen the global income effect. The interaction with creditors shows that there is indeed a stronger global income effect when expected bankruptcy costs are higher. This is not observed for low level tax changes, consistent with the idea that only high level tax changes carry this additional 'benefit' of expected bankruptcy cost (Table 2.11).

2.6.7 Additional tests

- Asset weighting

Though the asset weighting structure creates a mechanical correlation between the dependent variable and the variables of interest, there was a good theoretical reason

why Huizinga et al. (2008) used assets as a weighting variable. The theoretical model produced these asset weights as a result of optimizing the leverage structure of the whole multinational. To ensure my results do not conflict with this theoretical reasoning I also run the tests using asset weights. The results are unaffected as can be seen in Table 2.13.

- Creditor rights

I run a robustness test including creditor rights as a control (Table 2.14). I use a measure based on La Porta et al. (1997) and Djankov et al. (2007) which measures the strength of creditor rights in a country. These measures are notoriously time invariant, meaning that the effect would be captured by my fixed effects already. Therefore, I use the adjusted version published by the World Bank and used in Safavian and Sharma (2007), which is more granular and therefore has more variation.[16]

- Over- and underrepresentation

As discussed in Section 2.3.2 several countries seem over- or underrepresented compared to their economic size. I exclude these countries and re-run the results. Based on the amount of entities, the underrepresented countries are Germany, Denmark, Poland, Austria and the Netherlands. Based on the total assets represented by the country, the overrepresented countries are Spain and the United Kingdom. Table 2.15 shows the results.

- Within country

In Table 2.16 I show results for several of the larger countries. It can be seen that the results are also present within the country for Germany, Spain, Italy, and France. The United Kingdom does not show a significant result. The UK has a relatively small group of higher hierarchy entities in the country (as can be seen in Table 2.1).

2.7 Discussion

Multinationals can shift the location where profits are taxed, or lower their tax base altogether. As a result, governments face declining income due to this tax optimization, calling into question both the fairness and the sustainability of government finance. I have shown that multinationals can reduce their tax bill by shifting their debt to high-tax countries which makes their debt tax shields more valuable as the interest cost is deducted at a higher tax rate. Apart from straining government finances the use of debt-shields can create substantial bankruptcy risks (White House and Treasury, 2012) and otherwise inefficient capital structures are sustained by the tax system.

In recent years the European Union and OECD have launched programs that make the topic of debt shifting especially relevant. The OECD has been on the

[16]Source: Doing Business Report, (no longer) available at http://www.doingbusiness.org.

charge against base erosion by companies in their Base Erosion and Profit Shifting (BEPS) initiative (OECD, 2014). The European Commission has put forth a new proposal on a Common Consolidated Corporate Tax Base (CCCTB) (European Commission, 2016) to reduce the discrepancies between countries, in an effort to curb avoidance behavior.

The OECD has created a guideline for earnings stripping rules that will not allow the deduction of interest when the interest expenses exceed a certain percentage of the entity's EBIT. This would reduce the problems described in this paper as it ties tax shields to profit rather than capital structure, however it does not affect firms with sufficient profit. The Trump Tax Bill (Tax Cuts and Jobs Act, 2017) includes such a rule. This will mitigate excessive cases, but not fully overcome the problem of interest based Tax Base Erosion. It will likely increase the importance of profitability and non-debt tax shields for the size of the global income effect.

The CCCTB would reduce exploitable gaps as a result of mismatches in the laws of several countries. However, as shown, it is not only important to ensure that the tax base of countries matches, but also the tax rates. The introduction of a common tax base reduces the ability of countries to compete on the bases of less broad tax bases and only allows competition on tax rates. As can be seen, this still creates substantial spillovers and can create ways for companies to avoid taxes.

With companies capable of shifting debt from country to country on a moments notice the need for international cooperation is larger than ever. While the OECD's BEPS framework and the EC's CCCTB are steps in the right direction, these are still not capable of fully counteracting the effects described in the previous sections. Attempts, by for instance Belgium, to treat equity and debt equally have so far not curbed the problem, but could be a future solution. However, it is important to ensure these rules are not abused.

2.8 Conclusions

In this paper, I investigate the effects of foreign and domestic taxes on leverage. This is an important issue, because finding effects of foreign taxes would imply that multinationals can gain a competitive edge as a result of different tax systems. Furthermore, it increases our understanding of leverage decisions by companies and yield relevant policy implications for governments.

I investigate the existence of three distinct effects. The local income effect, corresponding to the standard trade-off theory. The substitution effect, predicting that multinationals shift debt to the country where it yields the highest tax benefit. The global income effect, which arises from the corporate structure of multinationals.

Existing theories suggests that foreign taxes have a significantly negative effect on leverage. While domestic taxes would have a significantly positive effect. I confirm these results. However, I also show the existence of a global income effect. This effect implies that the increase in total leverage is larger than the sum of the local income effects of the multinational. I find supportive evidence for this effect. I show the group structure of the multinational has a direct effect on whether the global income effect or the substitution effect dominates. The global income effect dominates the substitution effect when foreign high-hierarchical-level entities face a

change to their taxes. Moreover, the effect is larger for entities facing high domestic tax rates. It shows that countries should use caution when unilaterally changing tax rates, as there could be spillovers. This is especially the case for countries with many higher level entities within their borders. I show that the effect is not driven by agglomeration effects. These would work in the opposite direction of my results. The effect can also not be explained by endogenous entry or specific measures targeting leverage.

My results imply that a foreign country increasing its tax rate can not only increase leverage in that country, but also in foreign countries. While the country initiating the tax change may be compensated for the lowered taxable base as a result of the higher tax rate, foreign countries will not. The existence of these spillovers stress the need for further cooperation on the taxation of firms. Recent moves to increase international cooperation only partially address these problems.

Future research will have to show whether these capital structure changes lead to any real investment changes. If no real economic activity changes, then no country benefits. Future research also has to point out whether the effects run mostly through internal or external capital markets.

2.9 Tables and figures

Figure 2.1: Multinational corporate structure

An example of a multinational company located in two countries. Entity A is the holding company, so it is part of the top hierarchical level within the multinational company. Entities B and C are the subsidiaries and are part of the lowest hierarchical level.

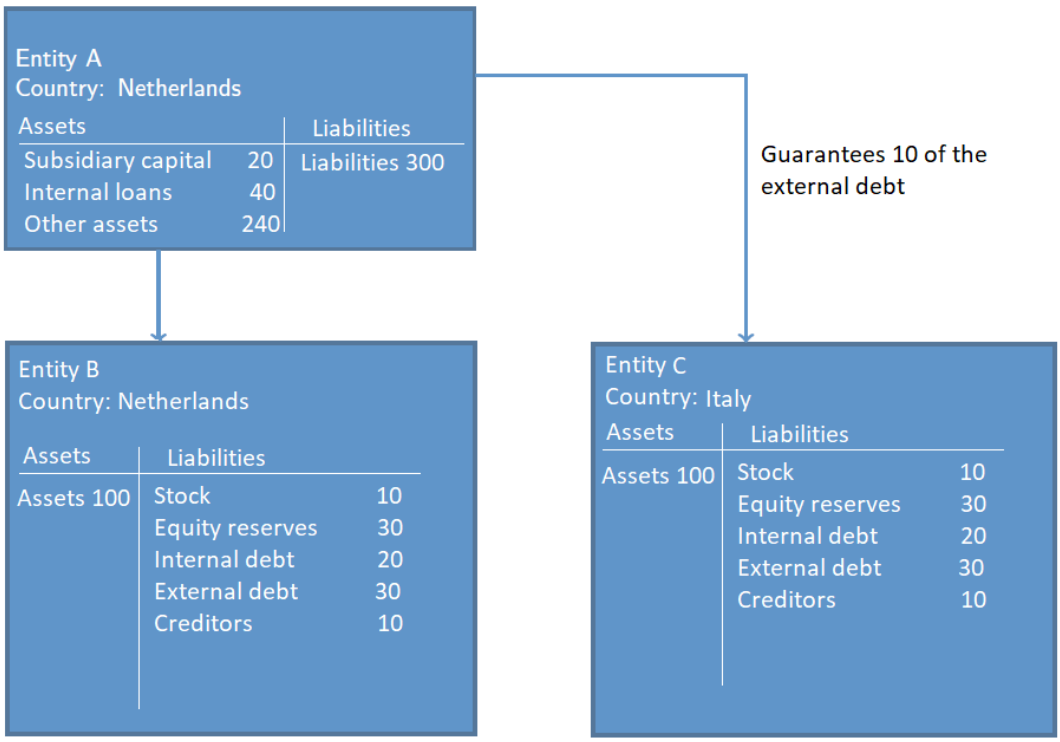


Figure 2.2: Leverage and tax rates

On the left axis the average tax rate across countries is displayed. On the right axis average leverage is displayed. Leverage has been adjusted for the effect of GDP-growth and interest differences across countries.

Figure 2.3: Multinational corporate structures

Figure (a) consists of two hierarchical levels, Figure (b) consists of three. The left structure displays a case in which Italy is only present at the lowest hierarchical level. The right structure displays a case in which it is present at both the second and the lowest level within the hierarchy of the multinational company.

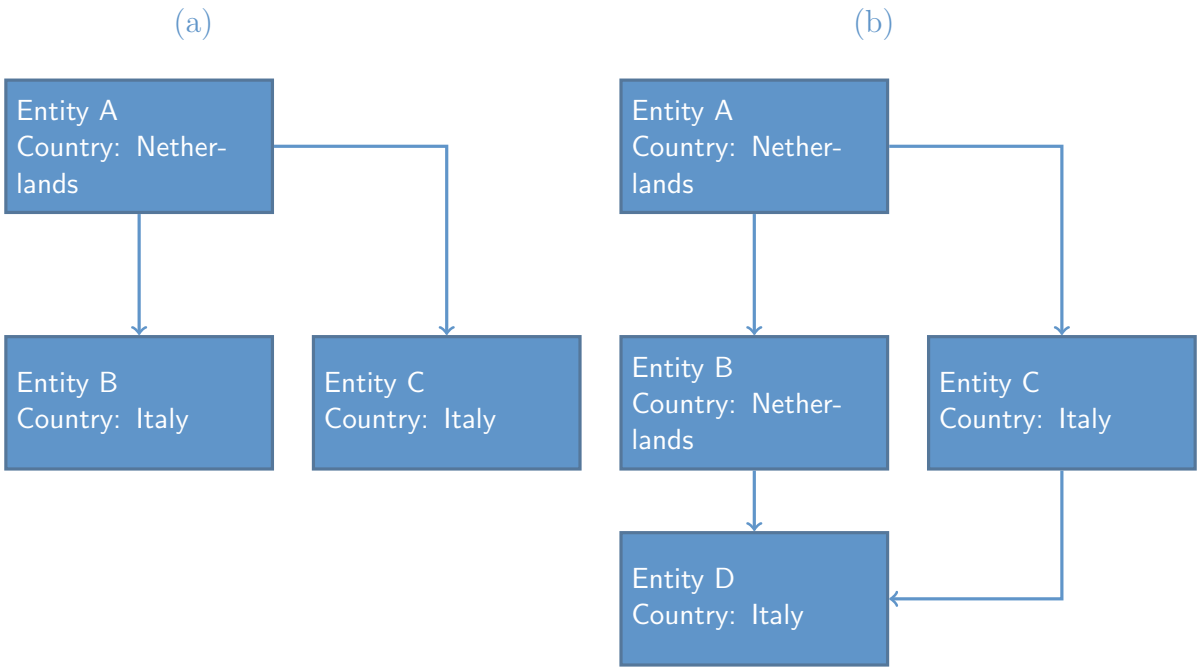


Table 2.1: Country and year distribution

Panel A shows the distribution of multinationals by year and number of countries they are located in. Panel B shows where the holding companies and subsidiaries are located

Panel A: Number of countries and year distribution

Number of countries	Observations	Percentage of total	Year	Observations	Percentage of total
2	6,637	54.50%	2005	7,244	16.57%
3	1,811	14.87%	2006	9,562	21.87%
4	953	7.83%	2007	3,136	7.17%
5	588	4.83%	2008	6,468	14.79%
5<countries<=10	1,034	8.49%	2009	7,426	16.98%
11<countries<=15	429	3.52%	2010	5,980	13.68%
16<countries<=20	165	1.35%	2011	3,908	8.94%
countries>20	561	4.61%			
Total	12,178	100%	Total	43,724	100%

Panel B: Country distribution

	Holding companies	Percentage of total holdings	Total entities	Percentage of total entities	Total Assets	Percentage of total
Austria	170	1.41%	753	1.72%	48,667,596	0.11%
Belgium	861	7.07%	2,490	5.69%	3,081,752,803	6.72%
Bulgaria	14	0.11%	590	1.35%	18,838,690	0.04%
Czech Republic	50	0.41%	890	2.04%	7,576,430	0.02%
Germany	1,002	8.23%	2,518	5.76%	3,737,655,784	8.15%
Denmark	439	3.60%	986	2.26%	26,584,742	0.06%
Estonia	60	0.49%	1,422	3.25%	2,918,558	0.01%
Spain	2,950	24.22%	5,614	12.84%	11,001,797,881	23.99%
Finland	635	5.21%	2,002	4.58%	34,986,881	0.08%
France	997	8.19%	4,167	9.53%	2,792,360,866	6.09%
United Kingdom	294	2.41%	3,081	7.05%	16,233,421,649	35.4%
Greece	61	0.50%	695	1.59%	24,830,139	0.05%
Hungary	27	0.22%	474	1.08%	12,187,825	0.03%
Ireland	11	0.09%	188	0.43%	6,699,779	0.01%
Italy	1,877	15.41%	3,803	8.70%	2,305,270,666	5.03%
Lithuania	12	0.10%	447	1.02%	423,553	0.00%
Luxembourg	33	0.27%	485	1.11%	2,859,248,515	6.23%
Latvia	23	0.19%	389	0.89%	779,528	0.00%
Netherlands	229	1.88%	949	2.17%	1,531,830,748	3.34%
Norway	190	1.56%	1,955	4.47%	774,301,577	1.69%
Poland	33	0.27%	2,047	4.68%	140,367,384	0.31%
Portugal	184	1.51%	3,112	7.12%	878,131,417	1.91%
Romania	8	0.07%	1,889	4.32%	25,101,088	0.05%
Sweden	1,305	10.72%	2,332	5.33%	316,383,007	0.69%
Slovenia	2	0.02%	53	0.12%	81,847	0.00%
Slovakia	12	0.10%	393	0.90%	715,367	0.00%
Rest of Europe	147	1.21%				
South and Central America	18	0.15%				
Canada	32	0.26%				
United States	495	4.06%				
Russia	7	0.06%				
Total	12,178	100%	43,724	100%		100%

Table 2.2: Summary statistics

Panel A shows the means, standard deviations and distributional characteristics of the main variables. Variables are defined as in Table 2.19. All variables are winsorized at the 1% level. Panel B shows the correlations between the main variables. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

Panel A: Summary Statistics

	Mean	Std. dev.	Median	Max	Min	10th perc.	25th perc.	75th perc.	90th perc.
Leverage	0.539	0.254	0.568	0.981	0.010	0.166	0.345	0.741	0.860
Tangibility	0.178	0.220	0.088	0.939	0.000	0.000	0.016	0.262	0.496
Profitability	0.055	0.142	0.039	0.534	-0.549	-0.041	-0.001	0.104	0.211
Depreciation	0.047	0.117	0.007	0.817	0.000	0.000	0.000	0.040	0.120
Sales	9.493	3.677	8.832	18.930	2.303	5.599	6.991	10.984	15.970
Tax rate	0.274	0.061	0.280	0.361	0.100	0.179	0.254	0.325	0.344

Panel B: Correlation

	Leverage	Tangibility	Profitability	Depreciation	Sales	Tax rate
Leverage	1					
Tangibility	0.0472***	1				
Profitability	-0.0869***	-0.0136**	1			
Depreciation	-0.134***	0.220***	-0.169***	1		
Sales	0.260***	0.0999***	0.110***	-0.173***	1	
Tax rate	0.188***	-0.0559***	-0.0623***	-0.0317***	0.122***	1

Table 2.3: Country-level leverage and tax rates

Leverage and tax are averaged over the entities and years in a country. Values are sorted by leverage from low to high. Variables are defined as in Table 2.19. Both leverage and tax are averaged over multinational-country years

	Leverage	Tax	Tax changes
Czech Republic	.339	.204	5
Poland	.392	.190	0
Austria	.415	.250	1
Luxembourg	.419	.237	2
Slovakia	.421	.190	0
Hungary	.427	.180	3
Denmark	.433	.273	2
Slovenia	.454	.201	4
Netherlands	.456	.274	4
Bulgaria	.460	.103	2
Estonia	.467	.277	4
Lithuania	.469	.151	3
Romania	.503	.160	1
United Kingdom	.507	.290	2
Latvia	.512	.150	0
Finland	.522	.260	1
Ireland	.529	.125	0
Sweden	.545	.274	1
Belgium	.550	.340	0
Spain	.557	.322	2
France	.557	.346	3
Germany	.619	.362	1
Portugal	.584	.262	2
Norway	.631	.280	0
Italy	.667	.312	1
Greece	.668	.259	4
Total	.539	.274	51

Table 2.4: Dominance of effects

This table presents the results for correlary 2. The dependent variable in all regressions is the local leverage. Variables are defined as in Table 2.19. Column 3 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 4 uses an interaction with a dummy for profitability. Column 5 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	Leverage	Leverage	Leverage	Leverage	Leverage
Foreign high	0.022**		0.024***	0.013	0.029***
levels tax	(0.009)		(0.009)	(0.010)	(0.010)
Foreign low		-0.018			
levels tax		(0.014)			
High levels interacted			0.506***		
with domestic tax			(0.230)		
High levels interacted				0.167***	
with domestic profitable				(0.064)	
High levels interacted					-0.040***
with domestic depreciation					(0.010)
Domestic tax rate	0.399***	0.402***	0.264*	0.394***	0.441***
	(0.104)	(0.104)	(0.156)	(0.104)	(0.111)
Tax difference	0.065***	0.061**	0.059**	0.065***	0.063**
	(0.025)	(0.025)	(0.025)	(0.025)	(0.027)
Firm Controls	Yes	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes
Observations	43,473	43,473	43,473	43,473	34,796
R-squared	0.772	0.772	0.773	0.773	0.740

Table 2.5: Total leverage effect

This table reports the results for a regression of total leverage on taxes. The dependent variable in all regressions is the total leverage of the multinational. Columns 2 and 4 show results in first differences. Variables are defined as in Table 2.19. Year and multinational fixed effects are included. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Total leverage	(2) ΔTotal leverage	(3) Total leverage	(4) ΔTotal leverage
Total tax rate	0.390***	0.339*	0.403***	0.341*
	(0.112)	(0.192)	(0.112)	(0.197)
Bottom levels tax rate			-0.181***	-0.351***
			(0.041)	(0.085)
Tangibility	-0.023	-0.106**	-0.021	-0.104**
	(0.025)	(0.044)	(0.025)	(0.044)
Profitability	-0.302***	-0.357***	-0.305***	-0.356***
	(0.032)	(0.060)	(0.032)	(0.060)
Depreciation	-0.184***	-0.139*	-0.194***	-0.161**
	(0.057)	(0.084)	(0.057)	(0.082)
Sales	0.025***	0.024***	0.025***	0.023***
	(0.002)	(0.003)	(0.002)	(0.003)
GDP growth	-0.004***	-0.004*	-0.004***	-0.004*
	(0.001)	(0.002)	(0.001)	(0.002)
Interest rate	-0.004	-0.014*	-0.003	-0.014*
	(0.004)	(0.008)	(0.004)	(0.008)
Year FE	Yes	Yes	Yes	Yes
Multinational FE	Yes	Yes	Yes	Yes
Observations	12,006	2,756	12,006	2,756
R-squared	0.811	0.341	0.812	0.354

Table 2.6: Local leverage effect

This table reports results for regression Equations 2.1 and 2.2. Columns 1 and 2 show the effect of domestic taxes on domestic leverage. Columns 3 and 4 show the effects of foreign taxes on domestic leverage. Colums 2 and 3 are results in first differences. Tax rate is defined as the top statutory tax rate. Foreign taxes are weighted by a countries sales contribution. The tax difference is the weighted difference between domestic and foreign taxes. The other variables are defined as in Table 2.19. Year and multinational-country fixed effects are included. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Leverage	ΔLeverage	Leverage	ΔLeverage	Leverage	ΔLeverage
Domestic variables						
Tax rate	0.423***	1.643***			0.404***	1.593***
	(0.102)	(0.175)			(0.104)	(0.181)
Tangibility	0.028**	0.045***	0.030***	0.048***	0.029**	0.046**
	(0.012)	(0.017)	(0.012)	(0.018)	(0.012)	(0.018)
Profitability	-0.208***	-0.150***	-0.212***	-0.150***	-0.211***	-0.151***
	(0.011)	(0.021)	(0.011)	(0.021)	(0.011)	(0.021)
Depreciation	-0.072***	-0.095***	-0.073***	-0.091***	-0.073***	-0.094***
	(0.014)	(0.020)	(0.014)	(0.020)	(0.014)	(0.020)
Log sales	0.023***	0.022***	0.023***	0.021***	0.023***	0.022***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP growth	0.000	-0.000	-0.000	0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Interest rate	-0.004***	-0.016***	-0.005***	-0.013***	-0.005***	-0.016***
	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)
Foreign variables						
Tax difference			0.104***	0.172***	0.061**	0.069*
			(0.026)	(0.040)	(0.025)	(0.042)
Tangibility			-0.000	-0.032**	-0.000	-0.032**
			(0.011)	(0.016)	(0.011)	(0.016)
Profitability			0.011	0.034	0.011	0.032
			(0.014)	(0.023)	(0.014)	(0.023)
Depreciation			0.016	0.025	0.014	0.010
			(0.025)	(0.032)	(0.024)	(0.032)
Sales			-0.001	-0.000	-0.002**	-0.002
			(0.001)	(0.001)	(0.001)	(0.001)
GDP growth			0.002**	-0.001	0.002**	-0.001
			(0.001)	(0.001)	(0.001)	(0.001)
Interest rates			0.014***	0.003	0.014***	0.003
			(0.002)	(0.003)	(0.002)	(0.003)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	43,475	12,353	43,473	12,353	43,475	12,353
R-squared	0.771	0.327	0.772	0.323	0.772	0.329

Table 2.7: Local leverage - agglomeration robust

This table is similar to Table 2.6, but contains an interaction for the country being a core or periphery country. Columns 1 and 2 use the Chase-Dunn et al. (2000) definition of a core country. Columns 3 and 4 use the Wallerstein (1976) definition. The dependent variable in all regressions is the local leverage of the subsidiary. Tax rate is defined as the weighted average marginal tax rate. The core country dummy is equal to 1 if a country is considered a core country. Control variables are defined as in Table 2.19. Year and multinational-country fixed effects are included. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)	(4)
	Leverage	Leverage	Leverage	Leverage
Domestic				
Domestic tax rate	1.188***	1.076***	0.786***	0.780***
	(0.251)	(0.252)	(0.126)	(0.127)
Core country	-0.877***	-0.770***	-1.190***	-1.239***
interacted with tax	(0.275)	(0.277)	(0.183)	(0.185)
Tangibility	0.027**	0.029**	0.029**	0.030**
	(0.012)	(0.012)	(0.012)	(0.012)
Profitability	-0.209***	-0.212***	-0.206***	-0.209***
	(0.011)	(0.011)	(0.011)	(0.011)
Depreciation	-0.073***	-0.073***	-0.070***	-0.070***
	(0.014)	(0.014)	(0.013)	(0.014)
Sales	0.023***	0.023***	0.023***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)
GDP growth	0.000	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Interest rate	-0.002*	-0.004***	-0.002	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Foreign				
Tax difference		0.063**		0.068***
		(0.025)		(0.025)
Tangibility		-0.000		-0.000
		(0.011)		(0.011)
Profitability		0.010		0.008
		(0.014)		(0.014)
Depreciation		0.012		0.012
		(0.024)		(0.024)
Sales		-0.002**		-0.002**
		(0.001)		(0.001)
GDP growth		0.002**		0.002**
		(0.001)		(0.001)
Interest rates		0.014***		0.014***
		(0.002)		(0.002)
Year FE	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes
Observations	43,475	43,473	43,475	43,473
R-squared	0.771	0.772	0.772	0.773

Table 2.8: Dominance of effects - agglomeration robust

This table shows the same regressions as columns 3 through 5 of Table 2.4, but contains an interaction for the country being a core or periphery country. The Wallerstein (1976) definition is used. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)
	Leverage	Leverage	Leverage
Top levels	0.025***	0.015	0.030***
tax rate	(0.009)	(0.010)	(0.010)
High levels interacted	0.538***		
with domestic tax	(0.192)		
High levels interacted		0.174***	
with domestic profitable		(0.065)	
High levels interacted			-0.034***
with domestic depreciation			(0.010)
Domestic tax rate	0.639***	0.774***	0.820***
	(0.173)	(0.127)	(0.132)
Tax difference	0.066***	0.073***	0.068**
	(0.025)	(0.025)	(0.027)
Core country	-1.263***	-1.257***	-1.283***
interacted with tax	(0.185)	(0.185)	(0.195)
Firm Controls	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes
Observations	43,473	43,473	34,796
R-squared	0.773	0.773	0.741

Table 2.9: Dominance of effects - Weights robust

This table shows the same regressions as columns 3 through 5 of Table 2.4, but using the weights at the first observation. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage
Top levels	0.019**	0.007	0.024**
tax rate	(0.009)	(0.010)	(0.010)
High levels interacted	0.460**		
with domestic tax	(0.194)		
High levels interacted		0.177***	
with domestic profitable		(0.065)	
High levels interacted			-0.046***
with domestic depreciation			(0.010)
Domestic tax rate	0.236	0.401***	0.448***
	(0.158)	(0.103)	(0.110)
Tax difference	0.116***	0.118***	0.151***
	(0.027)	(0.026)	(0.030)
Firm Controls	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes
Observations	43,473	43,473	34,796
R-squared	0.772	0.772	0.740

Table 2.10: Dominance of effects - Thin-capitalization robust

This table shows the same regressions as columns 3 through 5 of Table 2.4, but excluding all observations after the introduction or change of thin-capitalization rules in that country. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. In column 4 I show an interaction with the presence of a strong thin-capitalization rule. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)	(4)
	Leverage	Leverage	Leverage	Leverage
Top levels	0.025**	0.015	0.023**	0.099***
tax rate	(0.010)	(0.011)	(0.011)	(0.013)
High levels interacted	0.359*			
with domestic tax	(0.203)			
High levels interacted		0.204***		
with domestic profitable		(0.070)		
High levels interacted			-0.039***	
with domestic depreciation			(0.010)	
High levels interacted				-0.155***
with thin-capitalization				(0.018)
Domestic tax rate	0.817***	0.712***	0.791***	0.303***
	(0.200)	(0.151)	(0.162)	(0.108)
Tax difference	0.106***	0.104***	0.065**	0.086***
	(0.029)	(0.029)	(0.030)	(0.028)
Firm Controls	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes
Observations	33,682	33,682	29,005	43,473
R-squared	0.759	0.759	0.738	0.773

Table 2.11: Dominance of effects - Bankruptcy cost

This table shows the same regressions as columns 3 through 5 of Table 2.4, but using a definition of leverage that only uses interest carrying debt. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Column 4 shows an interaction with the amount outstanding at creditors. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Leverage
Top levels	0.007	-0.019	0.009	-0.006
tax rate	(0.013)	(0.015)	(0.015)	(0.014)
High levels interacted	0.979***			
with domestic tax	(0.193)			
High levels interacted		0.405***		
with domestic profitable		(0.094)		
High levels interacted			-0.031**	
with domestic depreciation			(0.015)	
High levels interacted				0.153***
with creditors				(0.044)
Domestic tax rate	0.569***	0.979***	1.054***	0.972***
	(0.175)	(0.126)	(0.131)	(0.126)
Tax difference	0.287***	0.305***	0.337***	0.319***
	(0.032)	(0.032)	(0.035)	(0.032)
Firm Controls	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes
Observations	30,555	30,555	25,590	30,555
R-squared	0.746	0.745	0.714	0.745

Figure 2.4: Leverage and tax rates

On the y-axis the corporate tax rate is displayed. On the x-axis the years are displayed.

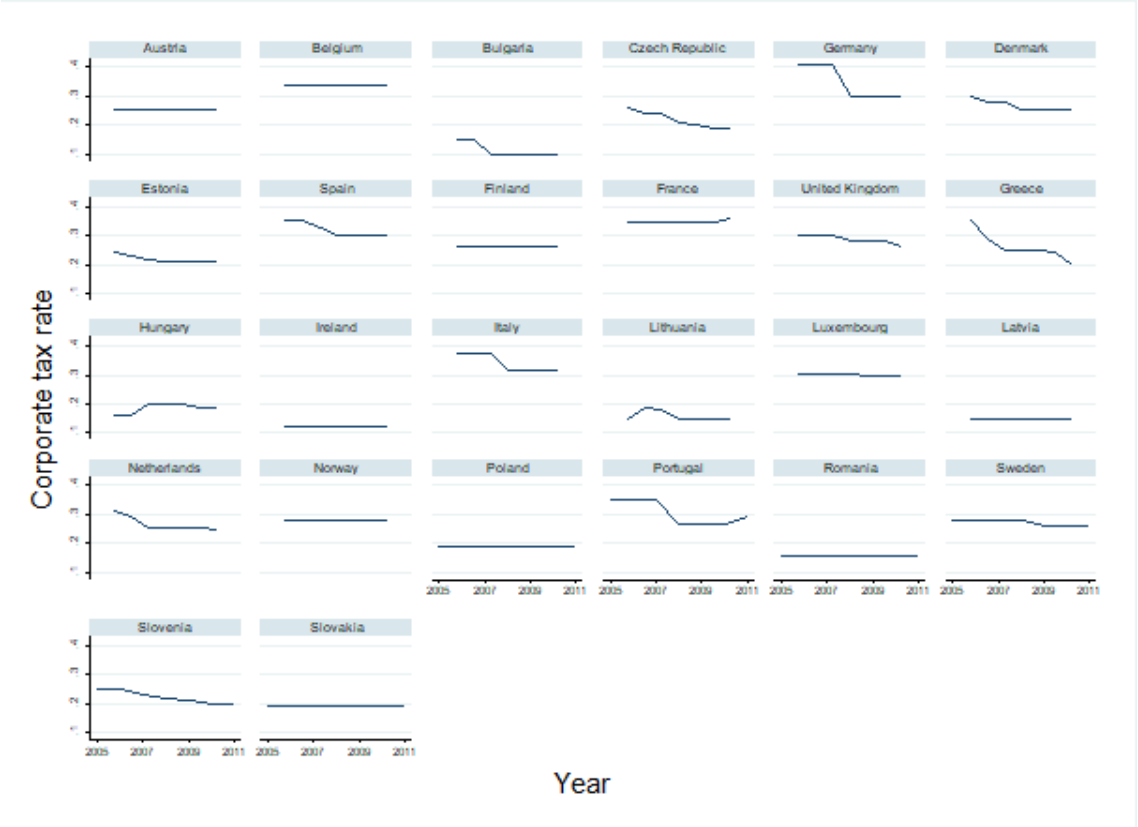


Table 2.12: Dominance of effects - Controlled Foreign Company

This table shows the same regressions as columns 3 through 5 of Table 2.4, but excluding observations from countries with Controlled Foreign Company rules, before the Cadburry Schweppes ruling. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage
Top levels	0.015	0.005	0.019*
tax rate	(0.010)	(0.010)	(0.010)
High levels interacted	0.691***		
with domestic tax	(0.214)		
High levels interacted		0.177***	
with domestic profitable		(0.066)	
High levels interacted			-0.041***
with domestic depreciation			(0.010)
Domestic tax rate	0.312*	0.412***	0.449***
	(0.160)	(0.108)	(0.113)
Tax difference	0.070***	0.076***	0.065**
	(0.026)	(0.025)	(0.027)
Firm Controls	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes
Observations	38,487	38,487	31,940
R-squared	0.767	0.767	0.737

Table 2.13: Dominance of effects - Asset weighting robust

This table shows the same regressions as columns 3 through 5 of Table 2.4, but using the weights based on total assets. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage
Top levels	0.019**	0.007	0.024**
tax rate	(0.009)	(0.010)	(0.010)
High levels interacted	0.460**		
with domestic tax	(0.194)		
High levels interacted		0.177***	
with domestic profitable		(0.065)	
High levels interacted			-0.046***
with domestic depreciation			(0.010)
Domestic tax rate	0.236	0.401***	0.448***
	(0.158)	(0.103)	(0.110)
Tax difference	0.116***	0.118***	0.151***
	(0.027)	(0.026)	(0.030)
Firm Controls	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes
Observations	43,473	43,473	34,796
R-squared	0.772	0.772	0.740

Table 2.14: Dominance of effects - Creditor rights

This table shows the same regressions as columns 3 through 5 of Table 2.4, but including an indicator for a countries creditor rights. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)
	Leverage	Leverage	Leverage
Top levels	0.024***	0.014	0.030***
tax rate	(0.009)	(0.010)	(0.010)
High levels interacted	0.502***		
with domestic tax	(0.188)		
High levels interacted		0.171***	
with domestic profitable		(0.064)	
High levels interacted			-0.040***
with domestic depreciation			(0.010)
Domestic tax rate	0.267*	0.404***	0.475***
	(0.156)	(0.104)	(0.112)
Tax difference	0.064**	0.071***	0.071***
	(0.026)	(0.025)	(0.027)
Foreign creditor rights	-0.002	-0.002	-0.003*
	(0.001)	(0.001)	(0.001)
Creditor rights	-0.003	-0.004	-0.008**
	(0.003)	(0.003)	(0.004)
Firm Controls	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes
Observations	43,463	43,463	34,788
R-squared	0.773	0.773	0.740

Table 2.15: Dominance of effects - Over- and underrepresentation

This table shows the same regressions as columns 3 through 5 of Table 2.4, but excluding countries that are underrepresented or overrepresented in the sample. The underrepresented countries are Germany, Denmark, Poland, Austria and the Netherlands. The overrepresented countries are Spain and the United Kingdom. Columns 1 and 4 use an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Columns 2 and 5 use an interaction with profitability. Columns 3 and 6 use an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage Underrepresented	(2) Leverage Underrepresented	(3) Leverage Underrepresented	(4) Leverage Overrepresented	(5) Leverage Overrepresented	(6) Leverage Overrepresented
Top levels	0.047***	0.037***	0.049***	0.055***	0.043***	0.057***
tax rate	(0.010)	(0.011)	(0.011)	(0.011)	(0.013)	(0.012)
High levels interacted	1.546***			0.425**		
with domestic tax	(0.242)			(0.196)		
High levels interacted		0.117*			0.179**	
with domestic profitable		(0.065)			(0.078)	
High levels interacted			-0.050***			-0.013
with domestic depreciation			(0.012)			(0.011)
Domestic tax rate	0.560***	0.616***	0.651***	0.440**	0.470***	0.527***
	(0.185)	(0.134))	(0.139)	(0.180)	(0.124)	(0.134)
Tax difference	0.062*	0.076**	0.043	0.184***	0.186***	0.175***
	(0.034)	(0.033)	(0.036)	(0.036)	(0.036)	(0.038)
Observations	34,573	34,573	28,404	31,498	31,498	25,031
R-squared	0.763	0.762	0.732	0.761	0.761	0.726
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.16: Dominance of effects - country

This table shows results for several of the larger countries in the sample. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage Germany	(2) Leverage Spain	(3) Leverage France	(4) Leverage UK	(5) Leverage Italy
Top levels	0.138*	0.083***	0.129***	0.050	0.092**
tax rate	(0.080)	(0.030)	(0.045)	(0.056)	(0.046)
Observations	819	3,778	1,898	1,317	2,143
R-squared	0.877	0.703	0.792	0.807	0.835
Year FE	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes

Table 2.17: Dominance of effects - Coinsurance

This table shows the same regressions as columns 3 through 5 of Table 2.4, but including a control for the degree to which the multinational is concentrated in industries. A higher value on the concentration implies a larger part of the assets are used in just 1 industry. Column 1 uses an interaction with the difference between the domestic tax rate and the average tax rate for the multinational. Column 2 uses an interaction with profitability. Column 3 uses an interaction with the standardized depreciation difference, defined as the domestic depreciation minus average depreciation, divided by the standard deviation of depreciation. Column 4 shows an interaction with the degree of industry concentration. Standard errors are clustered at the multinational level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Leverage	(2) Leverage	(3) Leverage	(4) Leverage
Top levels	0.028***	0.016	0.030***	0.034***
tax rate	(0.010)	(0.011)	(0.010)	(0.012)
High levels interacted	0.553***			
with domestic tax	(0.202)			
High levels interacted		0.222***		
with domestic profitable		(0.070)		
High levels interacted			-0.040***	
with domestic depreciation			(0.010)	
High levels interacted				-0.042
concentration				(0.038)
Domestic tax rate	0.201	0.351***	0.378***	0.354***
	(0.164)	(0.115)	(0.116)	(0.114)
Tax difference	0.067**	0.077***	0.076**	0.078***
	(0.030)	(0.029)	(0.030)	(0.029)
Concentration	0.011	0.009	0.014	0.017
	(0.011)	(0.011)	(0.012)	(0.013)
Firm Controls	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes
Observations	36,064	36,064	34,788	36,064
R-squared	0.744	0.744	0.740	0.744

Table 2.18: Additional tests: standard errors

This table presents the results from robustness tests on the clustering of standard errors. Column 1 shows the results for clustering on the countries the multinational is present in. Column 2 shows double clustering on the the multinational and the countries the multinational is present in. Column 3 shows the results for clustering on country-industry. Control variables are as in the original regressions. These variables are defined as in Table 2.19. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1)	(2)	(3)
	Leverage	Leverage	Leverage
Top levels tax rate	0.049***	0.049**	0.049***
	(0.014)	(0.021)	(0.015)
Domestic tax rate	0.746***	0.746	0.746***
	(0.140)	(0.484)	(0.281)
Tax difference	0.071*	0.071*	0.071***
	(0.038)	(0.042)	(0.017)
Company controls	Yes	Yes	Yes
Country controls	Yes	Yes	Yes
Foreign Tax control	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Company FE	Yes	Yes	Yes
Observations	24,940	24,940	24,940
R-squared	0.793	0.793	0.793

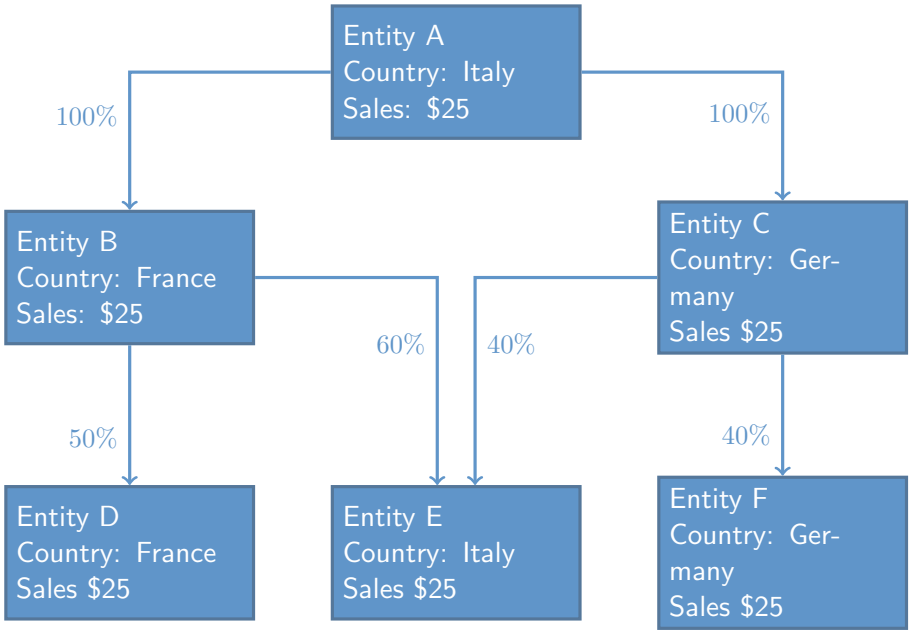
Table 2.19: Variable definitions

This table provides an overview of the variables used throughout this paper. Accounting data is obtained from the Orbis database, tax information is obtained from Ernst & Young World Wide Corporate Tax Guides. The country level variables are obtained from World Bank Data and Datastream. i indicates the multinational company, c indicates the country and t indicates time.

VARIABLE	DESCRIPTION	SOURCE
$Leverage_{ict}$	Measures the liabilities compared to total assets of the entity. $\frac{\text{non-equity liabilities}_{ict}}{\text{total assets}_{ict}}$	Bureau van Dijk's Orbis Database
Total leverage$_{it}$	$\sum_{c=1}^{N} \frac{\text{non-equity liabilities}_{ict}}{\text{total assets}_{ict}}$	Bureau van Dijk's Orbis Database
$Tangibility_{ict}$	Measures the tangible assets of an entity. Proxies for collateral and financing needs. $\frac{\text{tangible fixed assets}_{ict}}{\text{total assets}_{ict}}$	Bureau van Dijk's Orbis Database
$Depreciation_{ict}$	Measures a companies depreciation normalized by sales. It proxies the size of non-debt tax-shields. $\frac{\text{depreciation}_{ict}}{\text{sales}_{ict}}$	Bureau van Dijk's Orbis Database
Sales$_{ict}$	The log of sales. Proxies for the size of companies. $\ln \text{sales}_{ict}$	Bureau van Dijk's Orbis Database
$Profitability_{ict}$	Measures entity profitability, defined as return on assets. $\frac{\text{EBIT}_{ict}}{\text{total assets}_{ict}}$	Bureau van Dijk's Orbis Database
$Interest_{ct}$	Country level risk free interest rate.	Thomson Reuters Datastream
$GDPgrowth_{ct}$	Annual GDP growth.	World Bank Data
Tax_{ct}	Marginal corporate tax rate.	E&Y Worldwide Corporate Tax Guide
Tax difference$_{ict}$	Weighted domestic tax minus weighted foreign tax. $\text{Tax}_{ct} * \frac{1}{\text{total sales}_{it}} - \sum_{k=1,k\neq c}^{N} \frac{\text{sales}_{ikt}}{\text{total sales}_{it}} * \text{tax}_{kt}$	E&Y Worldwide Corporate Tax Guide
Top levels	Country year observations where the highest level in that country exceeds the average level for the whole multinational. In Figure 3.1(a) Italy is at the bottom level, while in (b) Italy is at the second level. In both cases Italy is below the average.	Bureau van Dijk's Orbis Database

2.10 Appendix A

Consider the following corporate structure for the year 2005.



Entity A is considered to be the parent company. The owners can be either natural people or an investment firm. Investment firms, pension funds and natural persons are not considered to be part of the corporate structure of the multinational. These usually provide initial funds but are not expected to be part of the optimization of the corporate debt structure in any other way than as an outside 'bank'. Companies B, C and D are all fully owned by the parent, either directly or indirectly and as such are included as part of the multinational. Entity E is partially owned by B and C. Entity D is a 50% owned subsidiary of entity B and as such is included in the structure. Entity F is partially owned by entity C and is also part of the structure. The corporate structure consists of six entities in a total of four countries. In the dataset they will be observed as follows:

Identifier Number	Year	Sales France	Sales Ger.	Sales Italy
1	2005	$25 + 25 = 50$	$25 + 25 = 50$	$25 + 25 = 50$

As can be seen the information of the two French and the two Italian companies is aggregated into one multinational-country data point. The observation in the above table is a multinational year observation. However, this is not the unit of measurement used in the regressions as no relevant way of determining what to regress on what can be made on the basis of this observation. The regressions use a

multinational-country-year observation. This means:

Id. Nr.	Year	own country	Sales own country	Sales France	Sales Ger.	Sales Italy	Total sales
1	2005	France	50	$25+25=50$	$25+25=50$	$25+25=50$	150
1	2005	Germany	50	$25+25=50$	$25+25=50$	$25+25=50$	150
1	2005	Italy	50	$25+25=50$	$25+25=50$	$25+25=50$	150

As can be seen, each country of the multinational's structure enters into the data as a separate data point. Since changes in foreign entity policy will simultaneously affect the domestic decisions a way of weighting these effects has to be introduced.

So if I now want to see how the leverage reacts to tax in other countries I create a weighted average of the tax rates in the foreign countries. The weights(Wt) are calculated as follows:

Id. Nr.	Year	Own count.	Sales own	Sales Fra.	Wt. Fra.	Sales Ger.	Wt. Ger.	Sales Italy	Wt. Italy	Tot. sales other
1	2005	France	50	50	0	50	$\frac{50}{100}$	50	$\frac{50}{100}$	$50+50=100$
1	2005	Ger.	50	50	$\frac{50}{100}$	50	0	50	$\frac{50}{100}$	$50+50=100$
1	2005	Italy	50	50	$\frac{50}{100}$	50	$\frac{50}{100}$	50	0	$50+50=100$

As can be seen the weight a certain country has depends on the total sales in the countries not being the own country. This dataset lets me not only measure effects of Entity A lending to Entity B and vice versa, but also of Entity B lending to Entity C or Entity A to Entity F. This uses less assumptions about how the firm will structure its internal capital market.

For each multinational-country-year I also determine the place in the hierarchical level. The above multinational has a Italian top-holding (level 1), two subsidiaries in France and Germany (level 2), which hold another three subsidiaries in France, Italy and Germany (level 3). When I refer to the highest level I mean the top of the hierarchy, in this case the Italian top-holding. Bottom levels are the lower levels. In this multinational the mean-level is $(1+2+2+3+3+3)/6 = 2.33$, so any multinational-country-year with a firm higher up in the hierarchy than this number will not qualify as low level. Since France and Germany have their highest level as level 2 they are not low level. Italy is not low level either, since its highest level is the top holding.

Chapter 3

Tax Avoidance Opportunities and Labor

3.1 Introduction

It is a well documented fact that companies shift income and debt in attempts to avoid taxes (Weichenrieder, 1996; Desai et al., 2006; Huizinga and Laeven, 2008; Dharmapala and Riedel, 2013; Cristea and Nguyen, 2016; Dharmapala, 2014; Zucman, 2014; Gumpert et al., 2016; Tørsløv et al., 2018; Damgaard et al., 2018; Desai et al., 2004). The debate on tax avoidance often focuses on tax revenues. However, little is known about how tax avoidance affects real corporate activities. Do companies shift income and debt on paper, or are the actual operations of the company affected?

Policy makers often argue that lower taxes can spur the demand for labor. Evidence on this topic is conflicting. Giroud and Rauh (2019); Ljungqvist and Smolyansky (2018); Suárez Serrato (2018) find evidence that corporate taxes reduce demand for labor. Mertens and Ravn (2013) find that while investment is affected, labor is not. Hassett and Hubbard (2002) show in an overview of the literature that most studies fail to find any evidence that corporate taxes affect investment decisions. In this paper, we examine whether employment in multinational companies is affected as a result of an exogenous shocks to tax avoidance opportunities.

Contrary to the recent literature (Ljungqvist and Smolyansky, 2018; Giroud and Rauh, 2019) we focus on a cross country setting. This allows us to investigate whether the increase in tax avoidance opportunities in one country, affects business in countries not directly affected. Moreover, we can investigate what conditions lead to positive or negative spillovers. We exploit a regulatory shock created by a ruling of the European Court of Justice (ECJ) (European Court of Justice, 2006), which generated opportunities for tax avoidance (Schenkelberg, 2018; Brok, 2019). The shock is particularly useful since it differentially affected multinationals on two dimensions. First, parent companies in seven countries where affected by the ruling, while parent companies in other countries were not. Second, only those with subsidiaries in low-tax countries were affected. We exploit both dimensions for our control groups.

Our paper complements the current literature by utilizing an exogenous shock to tax avoidance opportunities, which was not related to any regulatory decisions at the country level, as the shock was created by the ECJ. Most recent studies (Giroud and Rauh, 2019; Ljungqvist and Smolyansky, 2018) utilize changes in state level taxes. However, these tax changes are often small and the effects can be confounded by regulations on the allocation of profits to establishments across different states. A company active in several states will have to pay state taxes in each state. The portion of their profits allocated to each state for this taxation depends on several factors. In many states, the size of the payroll directly affects the proportion of the companies profits to be taxed in the different states. Shifting labor from one state to another therefore directly impacts taxable income in each state. In our setting this is not the case as we look at the effects on separate legal entities across countries. Each of these entities will be individually taxed on their profits, even if they are part of the same multinational.

There are three possible reactions to the shock. Firstly, the treated multinational increases the demand for labor in the low-tax country, since the drop in the effective tax rate makes it more profitable to invest in the low-tax country. Secondly, the company increases demand for labor in other non-treated countries it is active in. The tax avoidance opportunities allow the company to lower the tax costs of operations, thereby increasing the profitability of new projects across the whole multinational structure. Lastly, there can be substitution of labor from one country to another. Giroud and Rauh (2019) document this substitution, but show this effect is strongest when payroll is used to allocate profits to states. Suárez Serrato (2018) discusses a similar substitution, arguing that when one tax avoidance opportunity closes, there will be substitution towards other low-tax regimes. Suárez Serrato (2018) argues this will lead to real economic impact as tax avoidance is less risky and more easily executed when there are actual economic activities being carried on. This is in line with the legal doctrine of 'economic substance', which requires actions to have a real economic purpose, beyond tax avoidance.

We find that treated firms increase their labor input in their pre-established subsidiaries. In order to provide further evidence on the net-effect of these changes within multinationals, we investigate the effect on subsidiaries in the same multinational which were not directly treated. We observe a positive spillover for these non-treated subsidiaries within the same multinational. They increase their labor input compared to subsidiaries in multinationals which did not have a treated subsidiary. The results therefore suggest that there were nuanced spill-over effects that also benefited non-treated affiliates within the multinationals. Overall, these results demonstrate that firms are responsive to changes in tax incentives by increasing overall employment.

The labor specific effects that we find are stronger for multinationals in high-wage industries and subsidiaries in high-wage countries, which suggests that high skill jobs are more affected. Klassen and Mescall (2015) show that companies relying more heavily on R&D are better positioned to utilize tax avoidance opportunities. These companies also employ higher wage jobs and therefore are in line with our findings. While we document clear evidence for stronger changes in employment outcomes for high-wage industries, one might expect that R&D expenditures are impacted as well. However, our evidence on the effects of R&D expenditures are inconclusive.

We find evidence that non-treated subsidiaries of a multinational which had at least one treated subsidiary are positively affected by the new tax avoidance opportunities. This suggests that these non-treated subsidiaries are able to reduce their tax costs as a result of being affiliated with a treated subsidiary. We find that subsidiaries in countries with a higher labor wedge (i.e. a higher difference in the wage received and the wage costs paid) are less responsive to the shock. Moreover, we find that subsidiaries in countries which already had a relatively low corporate tax rate before the new opportunities arise were less affected.

This paper contributes to the finance and labor literature, which documents the relationship between financial frictions and firm level investments outcomes (Kaplan and Zingales, 1997, 2000; Almeida et al., 2004) and more recent papers documenting the relation between frictions and firm level employment (Benito and Hernando, 2007; Caggese and Cuñat, 2008; Beck et al., 2010; Benmelech et al., 2011; Pagano and Pica, 2012; Chodorow-Reich, 2013; Popov, 2014; Cingano et al., 2016; Popov and Rocholl, 2017; Beck et al., 2018). Contrary to this literature, we study the effects of a different constraint on business, and find it is a significant determinant of employment. We document that firms increase their investment via increased

employment as a result of a reduction in tax induced frictions, similar to the effect of lower financial constraints. While this behavior is not replicative of a traditional set-up involving financially constrained firms vs. financially unconstrained firms, the underlying behavior is a direct result of an alleviation on a friction, in this case taxes. Overall, the results of this study show that firm level employment outcomes are sensitive to changes in real corporate tax rates.

In addition, there are several papers that also examine the effectiveness of legislation and tax incentives on resulting firm level investment behavior (Bennedsen and Zeume, 2017; Suárez Serrato, 2018; Garrett and Suárez Serrato, 2019; Giroud and Rauh, 2019; Faulkender et al., 2019; Ljungqvist and Smolyansky, 2018). Ljungqvist and Smolyansky (2018) show that increases in state level taxes decrease labor, while decreases only have an effect during recessions. Suárez Serrato (2018) shows that eliminating a tax haven can lead to decreases in local firm level employment, and substitution towards production abroad. We add to this literature in two ways. First, the shock we employ was the result of a ruling by the European Court of Justice. While the court case originated in the UK, the court ruling also applied to several other European countries. This means that the shock was not the result of government policy, nor was it part of a larger tax overhaul, instead it was imposed by an independent supranational institution. Secondly, we can observe what happens to all the subsidiaries of the company, which allows us to investigate spillover effects within multinationals.

Furthermore, we contribute to a much more recent literature on multinational investment behavior, profit shifting, taxation and legislation. To date, many papers have documented multinational profit shifting activities, also known as Base Erosion and Profit Shifting (BEPS) (Weichenrieder, 1996; Desai et al., 2006; Huizinga and Laeven, 2008; Dharmapala and Riedel, 2013; Cristea and Nguyen, 2016; Dharma-

pala, 2014; Zucman, 2014; Gumpert et al., 2016; Tørsløv et al., 2018; Damgaard et al., 2018). Several papers have also used our institutional setting to examine the resulting changes in multinational BEPS activities across Europe (Ruf and Weichenrieder, 2013; Overesch et al., 2018; Schenkelberg, 2018; Brok, 2019). Contrary to this research, we examine the effects of tax avoidance on the real activities of companies. We complement their work by demonstrating that while non-value adding profit shifting activities are prevalent, there can be real changes in production activities as well.

We observe in our setting the non-treated subsidiaries of treated parent companies. This allows us to not only examine the consequential firm level labor specific investment behavior, but to control for a variety of alternative confounding effects as well. Most studies have been mainly able to utilize country specific shocks, while our set-up allows us to exploit an international setting with two degrees of heterogeneity. This is an important distinction for it allows us to exploit both parent-country and subsidiary-country level heterogeneity while also allowing us to control and isolate other potential confounding effects at the firm and country level. Furthermore, the nature of our data allows us to examine in detail, the precise changes on employment at the subsidiary level of the multinationals, thereby giving us a better picture of the aggregate changes in employment.

The remainder of the paper is structured as follows: Section 3.2 elaborates on the institutional setting and 3.3 on the composition of the data and methodology. Section 3.4 presents the main empirical findings and 3.5 provides a series of robustness tests. Section 3.6 discusses how the results fit a broader context with respect to historical tax rates and unemployment. Section 3.7 concludes.

3.2 Institutional Setting

3.2.1 Institutional setting

Domestic laws of EU countries have to be in line with the treaties of the European Union. When a conflict arises the European Court of Justice (ECJ) provides rulings on any aspects of a case that deal with those European treaties and regulations. When such a ruling is issued it affects not only the specific case, but all similar cases in that country and in other EU countries.

In this paper we use the so called Cadbury Schweppes case (European Court of Justice, 2006) as an exogeneous shock to tax avoidance opportunities. This case from 2006 dealt with a UK company asserting that the domestic law of the UK was violating EU treaties. The specific article of law dealt with a Controlled Foreign Company (CFC) rule. CFC rules affect multinational companies with subsidiaries in low tax countries. Profits from low-taxed subsidiaries will be additionally taxed in the country of the parent, for the difference between the tax rates of the countries. For instance, if a UK parent company (30% corporate tax rate) sets up subsidiaries in Ireland (12.5% corporate tax rate) and Austria (25% corporate tax rate) the profits from the Irish subsidiary will be taxed for 30-12.5=17.5%. However, the Austrian profits will not be additionally taxed, because the UK CFC rule does not consider the Austrian tax rate as low. This imposes a penalty on companies that set up activities in low tax EU countries. While no such penalty was imposed on companies setting up activities in a higher taxed EU country. Doing so is a limitation to the freedom to establish anywhere in the EU. Such a limitation is not allowed under EU regulations, unless there is a legitimate justification for it, such as tackling tax avoidance.

The ECJ judged that CFC rules are effectively a presumption of guilt, due to the indiscriminate application of the rules to all subsidiaries in low tax countries

regardless of intent. As a result of the ruling, national tax authorities had to prove that a company's main motivation for establishing in a low-tax EU country is a reduction of the taxable base. How exactly to establish this was not specified in the ruling. The ruling opened up opportunities to avoid taxes via low-tax EU countries, as long as there was some economic activity going on as well. All EU countries with a CFC rule were affected by the ruling, which include parent companies from the Denmark, Germany, Hungary, Luxembourg, Norway[1], Portugal and Sweden. However, the companies are only affected if they have a subsidiary in a low tax country.

Two further important distinctions need to be made with respect to the institutional settings used by previous papers in the related literature. First, the CFC rules imposed additional taxes on all low-taxed subsidiaries, not just European ones. After the ECJ ruling, it was not allowed to apply the CFC regulations to European low-taxed subsidiaries, but it was still allowed to use them against non-European subsidiaries. This means that contrary to the setting of Suárez Serrato (2018) there were limits to tax avoidance across the globe. Second, we observe separate legal entities in different countries, rather than establishments in different states. This is important because the allocation of profits to different states differs from the allocation of profits to countries. The allocation of profits to states usually depends on the sales in a state, but often it also depends on the total amount of the payroll paid in that state. This means that having relatively higher payroll in a state increases the amount of profit taxable in that state. An increase in the profit tax in a state therefore creates an incentive to move labor to another state, thereby decreasing the percentage of the profits to be allocated to that state. This incentive does not exist in our setting.

[1]Norway is part of the EEA, not the EU. However, the ruling also applied to EEA countries.

3.2.2 Hypothesis formulation

There are several possible reactions to the increase in tax avoidance opportunities. First, profit of the low-taxed subsidiary is taxed less. Therefore the costs of investment in the low-tax country decreases. The company increases activities and by extension the demand for labor in the low-tax country.

Hypothesis 1: *The affected subsidiary increases labor.*

Second, the multinational can now avoid a fraction of all taxes paid by the company by shifting income from all the countries it is active in, towards the low tax country. As a result, the expected taxes to be paid are reduced for all of its subsidiaries, increasing the profitability of their projects. Therefore the company can increase its activities and therefore the demand for labor inputs in all its subsidiaries.

Hypothesis 2: *The higher taxed subsidiaries of a treated multinational increase their labor*

Third, following Suárez Serrato (2018) the company moves part of its production from other countries to the low-tax country to make better use of the lower tax rates. The effect is driven by the assumption that the costs of tax avoidance are lower when there are more real activities in the tax haven. Compliance with tax law often requires firms to set up actual activities in the tax haven, to create what is known as economic substance. The ECJ ruling did allow for the application of CFC rules to companies lacking economic substance. So if the ECJ ruling opened up more lucrative tax havens, the old, less lucrative, havens would be abandoned for the new ones. This would reduce the need for substance in the old and creating the need for substance in the new tax haven.

Hypothesis 3: *The affected higher taxed subsidiaries reduce their labor*

The three hypotheses are not necessarily mutually exclusive for a multinational. The multinational can increase activities in the tax haven for the purposes of tax compliance, while at the same time increasing investment in its most productive firms, and reducing it in places where they previously benefited from a tax advantage. Furthermore, a similar shifting of labor can occur in the situation where profits are allocated to establishments on the basis of payroll. This is however not the case in our setting.

3.3 Data and Methodology

3.3.1 Data

Information about tax rates and the existence of CFC rules are obtained from the Ernst&Young World Wide Corporate Tax guides. This information is augmented with specific details of each CFC rule, which has been obtained from the national laws of the countries.

Company level information is obtained from the Bureau van Dijk Orbis database. This database provides both information on the ownership of companies and the accounting information. We keep all companies that had information available in 2004 (two years before the shock) and had at least three consecutive years of data available. This is necessary in order to establish the existence of common trends before the shock, and a differential effect after the shock. Furthermore, we exclude all companies without subsidiary or parent information. This information is required to establish whether a parent company is located in a country with a CFC rule and to establish whether its subsidiary is located in a low tax country.

We do not impose any restrictions on the ownership percentage as missing data would restrict the sample too much. If a parent were to only own a small part of a subsidiary, it would be unlikely that this company engages in tax avoidance. Therefore, keeping these companies in the sample biases the results towards zero.

Denmark, Germany, Hungary, Luxembourg, Norway, Portugal and Sweden had CFC rules in effect at the time of the ruling. These rules all differ slightly from country to country. The most significant difference is the definition of low-tax countries. We obtain the specific definition from the national laws of the country. Depending on the specific country, there are between 3 and 10 countries in Europe marked as low-tax countries.[2] The differences can be substantial. Germany classifies all countries with a corporate tax rate below 25% as low-tax. Luxembourg only classifies countries with tax rates below 15%. Panel A of Table 3.1 details which countries had CFC rules and what tax rate is considered low under that countries rule. Panel B details the tax rates in the year prior to the shock (2005) for all countries in our sample. Several EU countries are excluded. Finland is excluded as it had a CFC rule, but did not apply it to countries it had a tax treaty with. Italy is excluded as it used a blacklist of countries, which included only one EU country: Slovakia. France and Spain are excluded as they made changes to their CFC rules during the 2004-2005 pre-period.

3.3.2 Methodology

One of the benefits of using a court case from the ECJ rather than a change in domestic laws is that the court is an independent body which tests the correct application of international treaties and hence is not a government trying to optimize domestic legislation. Therefore, it is hard to argue that the ECJ was trying to affect demand for production factors when it ruled on the Cadbury Schweppes case.

[2]Note that the application of CFC rules on profits from non-EU subsidiaries is not in violation of EU law.

The case creates heterogeneity along two lines. For a company to be affected it needs to have both a parent in a CFC country and a subsidiary in a low-tax country. If either of those conditions is not fulfilled, the company will not be affected. This means that in Figure 3.1 the company under (a) is treated, as the UK had a CFC rule and Ireland qualified as a low tax country under this rule. The treated subsidiary is therefore the Irish subsidiary and its parent is a treated parent. In Figure 3.1(b) there is no low-tax subsidiary, so none of the subsidiaries or the parent are treated, despite the fact that the UK parent is located in a CFC country. In Figure 3.2(a) the same treated company can be observed. The company in Figure 3.2(b) has a subsidiary in a low tax country, however its parent did not face a CFC rule. These two levels of heterogeneity allow us to distinguish between the hypotheses formulated in Section 3.2.2.

Hypotheses 1 suggests that labor increases for the subsidiary in the low-tax country. In Figure 3.1(a) this suggests that entity C benefits, compared to entities B and C in Figure 3.1(b). To test hypothesis 1 we therefore compare entity C in Figure 3.1(a) with entities B and C in Figure 3.1(b). Alternatively, we compare entity C in Figure 3.2(a) with entity C in Figure 3.2(b).

By utilizing both control groups, we can keep the institutional settings of the parent or subsidiary country stable. Finding similar results in both settings will alleviate concerns that country specific institutional settings drive our results. To further alleviate any additional concerns, we include a fixed effect for the subsidiary in the subsidiary regressions and the parent in the parent regressions. A year fixed effect is included to control for year specific events.

For testing hypothesis 2 and 3 we compare companies affiliated with a treated

subsidiary, to companies without such an affiliation. This means that in Figure 3.2 we compare entity B in (a), with entity B in (b). Interacting the treatment with the subsidiary tax rate allow us to investigate the hypothesis that previously classified low tax countries see some of their labor substituted towards the new tax haven.

Our dependent variables are log of employees and log of employment cost. In all regressions, we control for tangibility as a proxy for the mobility of the companies assets. Profitability is used to proxy for the companies need to use tax avoidance and the ability to afford moving. Leverage and depreciation is used as proxies for the use of alternative tax avoidance tools and the ability to borrow for future investments. The log of sales is included as a proxy for firm size. Lastly, GDP growth, the corporate tax rate, and interest rates are included to control for the business environment.

The regression equation we use in our analysis is:

$$\ln(y)_{it} = \beta_1 * \mathbb{1}\text{Treated group}_{it} + \beta_2 * \mathbb{1}\text{After shock}_{it} + \beta_3 * \mathbb{1}\text{Treated*After shock}_{it}$$

$$+\beta_4 * X_{it} + \beta 5 * Z_t + \epsilon_{it}$$

Where i and t indicate firm and time respectively, X and Z represent the vector of firm level and country level controls respectively, and y is one of the respective dependent variables indicated earlier.

3.4 Empirical Results

3.4.1 Affected subsidiaries

In this section, we investigate the effects of the Cadbury Schweppes shock on the use and allocation of production factors by multinational companies. First, we test Hypothesis 2 by looking at how treated subsidiaries are affected. Figure 3.3 shows the effect of the shock on the natural log of labor costs in the years around the shock.

The baseline year is 2005, the coefficients measure the effect of being in the treated group, compared to this baseline. For the common trend assumption to be fulfilled, the coefficient for 2004 needs to non-distinguishable from zero. This is what we find. Not only does the figure show that there was no differential trend before the 2006 shock, we also see that the shock had a significant impact on the labor costs of subsidiaries. This effect is initially smaller than after 2 years of the shock.

In Columns 1-3 of Table 3.2 we test the effect using Equation 3.3.2 with the natural log of labor costs as a dependent variable. The different specifications show the effect for three different control groups. Column 1 shows the effect when the control group consists of subsidiaries of parents not facing a CFC rule, but located in a low tax country. Entity C in Figure 3.2. Column 2 shows the effect when the control group consists of subsidiaries of parents facing a CFC rule, but who are not themselves located in a low tax country (Entity B and C in Figure 3.1(b)). Column 3 shows the effect when the control groups consists of both of the control groups combined. In all specifications, standard errors are clustered at the country-industry level. Similar results are obtained clustering at the parent company level. Year and subsidiary fixed effects are also included.

All three specifications show a strong effect of the treatment on labor costs. The tax rate has limited effect on labor, only showing up significant in the first specification. Profitability and sales are important determinants of labor costs. This makes intuitive sense, as larger firms will likely have more employees. Profitable firms show lower labor costs, while tangibility is associated with higher labor costs, suggesting that labor and capital are complements. Sales is the strongest determinant of labor costs, with 1 standard deviation higher sales (1.670) being associated with 97% higher labor costs.

Looking at specification 3 we can see that the effect of the shock was substantial. Treated companies increased their labor costs by over 13%. We can see that the model explains a large part of the variation in labor costs. This is to a large extent due to sales and the fixed effects.

It is important to investigate whether these companies expanded their number of employees, or their costs of employees. Figure 3.4 shows the effect of being in the treated group for each year in the sample. Again, we observe no differential trend before the shock, but a differential trend after the shock. In Table 3.2 columns 4-6 we test the effect of the shock. For the control variables we observe similar patterns to the ones described above.

The treatment effect suggests an increase in the number of employees of 4-7% for the treated companies compared to the control companies. This suggests that the shock had a substantially larger effect on the labor costs than on the number of employees, compared to the tangibility of the firm. This could indicate that it is mostly higher quality (more expensive) groups of labor that are affected.

Cross-sectional results and implications

In Table 3.3 we investigate if indeed higher wage firms increase their labor more. In columns 1 and 3 we interact the treatment with a dummy for a country having an above median wage. This allows us to distinguish between low-tax countries which are also low wage countries, and low-tax countries where wages are relatively high. We obtain the country level average wages from the OECD. We then take the median across countries. Those countries with an above median average wage are high wage countries. In columns 2 and 4 we run an interaction with high wage industries. We also calculate the labor costs per employee for each industry. Industries with

above median costs per employee are considered high wage. For both interactions, we can see that the effect is considerably higher when wages are high (3 times and 1.5 times stronger for country wages and industry wages respectively). This could indicate that these are more skill intensive jobs.

Findings in Klassen and Mescall (2015) suggest that R&D allows companies to more easily move profits from one country to another, making it easier to avoid taxes. Jobs in R&D intensive industries are also more skill intensive. This would imply that firms are more likely to increase R&D expenditures than investment in physical assets. To test this hypothesis, we look at the effect the shock had on CAPEX and R&D expenditures. Since the Orbis database does not consistently report on either, we need to approximate both. We define CAPEX as the growth in tangible assets + depreciation, while R&D expenditures is measured as the growth in intangible assets. The latter is admittedly a rough proxy.

In Figures 3.5 and 3.6 we verify the common trend assumption for both CAPEX and R&D expenditures. Once again, we can see that the coefficients in the year 2004 are not significant, meaning that there was no statistically significant difference between the treated and control companies in the years before the shock. For CAPEX we do not observe any effect after the shock either, while for R&D expenditures the second year after the shock is significantly positive. These results are confirmed in Table 3.4. Columns 1-3 show no significant effect of the shock for CAPEX, suggesting companies did not invest in immobile assets. However, for R&D the results are inconclusive. We observe that subsidiaries of parents located in a country with a CFC rule that there is a strong differential effect on R&D expenditures between those in low and high tax countries (i.e. in Figure 3.1 between Entity C in (a) and (b)).

We observe a strong negative effect of the tax rate on the investments of the companies. A one percentage point increase in the tax rate is associated with a 1.2 and 1.45 increase in the natural log of CAPEX and R&D expenditures respectively. Unsurprisingly, tangibility and depreciation are strongly related to CAPEX, while both CAPEX and R&D expenditures are positively related to size. The model explains about 88% of the variation in CAPEX and 78% of the variation in R&D expenditures. This is again for a large part due to sales and the fixed effects.

3.4.2 Affiliated Subsidiaries

Hypotheses 2 and 3 suggest that it is possible that not only the treated subsidiary, but also its affiliated subsidiaries might be affected (i.e. in Figure 3.2(a) the Austrian subsidiary is also affected by the shock to the Irish subsidiary. Figures 3.8 and 3.7 show the tests for a common trend among the treated and non-treated affiliated subsidiaries. We find there is a common trend before the shock.

We compare the effect of the shock on subsidiaries which are affiliated with treated subsidiaries, to subsidiaries of companies which had a low tax subsidiary, but were unaffected due to their parent not being located in a CFC country. We compare entity B in Figure 3.2(a) (treated), with entity B in Figure 3.2(b).

Table 3.5 shows the results. There is a strongly positive effect of the treatment on the labor costs and employment of the affiliated subsidiaries. The treatment resulted in an increase of 2.6% in employment and 12% in costs of employees. The effects are about half as strong as those found in Table 3.2. This suggests there were positive spillovers to other subsidiaries.

Cross-sectional results and implications

Hypotheses 2 and 3 predict opposing effects. While the above results are in line with hypothesis 2, the whole multinational benefits from the low-tax regime, it does not rule out that for some parts of the multinational hypothesis 3 is correct. Suárez Serrato (2018) noted that there was substitution from a tax haven that was being closed off to new tax havens. If this is the case, then we would expect that the subsidiaries that faced a lower corporate tax rate before the shock would be negatively impacted. We calculate the terciles of the corporate tax rate for the non-treated subsidiaries in a multinational and test this hypothesis.

While in Table Table 3.6, we find that the effect is strongly reduced for these subsidiaries, it is not negative. This suggests there was no strong substitution. The difference with Giroud and Rauh (2019); Suárez Serrato (2018), who both find substitution, can easily be explained by differences in the institutional setting. In the setting of Suárez Serrato (2018) a tax haven was being closed. This lead companies to move to new tax havens. In the case of our shock, all low-tax countries were similarly affected by the CFC rules, regardless of their location. After the ruling of the ECJ, European low-tax countries were no longer affected by the CFC rules. This means that contrary to the setting in Suárez Serrato (2018) there was no haven safe from CFC rules before, so no substitution can take place.

Similarly, in the case of Giroud and Rauh (2019), who look at differences across US states, the institutional setting is very different. Across US states, profits need to be apportioned. This means that a US company with establishments in several US states will have to allocate profits to different states for the purposes of state taxation. This apportionment is done on the basis of several criteria. In most states, the fraction of the payroll paid in that state is one of these criteria. This creates additional incentives to shift labor across state lines.

In Table 3.6 we further investigate which affiliated subsidiaries are most affected. We find that the subsidiaries in countries with a relatively high labor wedge are less positively affected.

3.5 Robustness and Extensions

3.5.1 Firm Entry

Apart from changes in the utilization of production factors, companies might also change their location choices. Therefore, we test whether parent companies in countries with a CFC rule are more likely to set up subsidiaries in low tax countries after the shock. The control group are parent companies located in countries without a CFC rule. The companies used here are not included in the main specifications, as this would create a problem with endogeneous location choice affecting our results.

Figure 3.9 shows the common trend for entry into low-tax EU countries. It can clearly be seen that in 2006 the entry rate jumped up for the treated companies. In Table 3.7 we show the results of the shock in a regression. Column 1 shows that the treatment increased the probability of a first time entry into a low-tax country by 3.5 percentage points for treated companies. This is about one and a half times the unconditional mean probability of first time entry into a low-tax country (2.42%). Column 2 shows that incorporation in other countries was negatively affected by the shock. This suggests that it was not the case that treated companies generally expanded more during this time, if anything, the results suggest that treated companies are actually less likely to enter into higher tax countries. This could indicate a substitution of locations in favor of the more tax advantaged countries.

3.5.2 Institutional framework

The Cadbury Schweppes case resulted from a dispute between Cadbury Schweppes plc. and HM Revenue & Customs. An argument can be made that a British company directly impacted the outcome of the case, by starting it. This could be related to a UK specific effect. To ensure that the observed effects are not driven by an unobserved Britain factor around the time of the shock, we exclude all companies with UK parents. The results are shown in Table 3.8. We still observe a strong effect on labor while no effect on investments is observed.

A second concern is the fact that the countries with CFC rules are Denmark, Germany, Norway, Portugal, Sweden, and the UK. These are among the most developed countries in the European Union. Several of the countries without CFC rules are low-tax countries, which had at the time only recently joined the EU. To ensure we are not picking up a fundamental difference between the EU-15 and EU-27 expansion countries which happened to coincide with the shock, we exclude all expansion countries (Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Slovenia, Slovakia). The results are shown in Table 3.9. The results are qualitatively unchanged.

3.6 Discussion

The results of our study showcase the immediate firm level reactions to tax-based policy shocks. Overall, we document a significant short-term reaction, whereby firms increase employment in subsidiaries as a result of lower tax rates. At first glance, these results rationalize politically motivated policies arguing for decreased corporate tax rates in order to attract jobs, businesses and employment.

While we do provide partial rationalization for increased national incentives to

decrease corporate tax rates, it is important to also assess how the subsidiary level results might relate to actual historical movements in unemployment and corporate tax rates. By using historical country level corporate tax rates from the OECD and unemployment data from the International Labor Organization from 1982-2015, we see that on average, when unemployment increases, countries are more likely to decrease their corporate tax rates. The results are reported in Table 3.10 and we control for year fixed effects, GDP per capita growth and government expenditures, which we collected from the World Bank Development Indicators database. All in all, the correlations suggest that countries are more likely to decrease corporate tax rates when there has been a recent surge in unemployment, which could indicate the hope of addressing these surges in unemployment by means of lower corporate tax rates. Therefore, the results from our subsidiary level study might indeed rationalize these historical correlations and trends.

3.7 Conclusion

The purpose of this study is to establish whether multinationals change their real business activities as a result of tax avoidance opportunities, especially when it comes to their labor input. By using a regulatory shock in Europe that decreased the effective tax rate of a specific set of multinational subsidiaries, we document that treated subsidiaries increase their employment as a result of this regulatory shock. Contrary to the prior literature we do not find any evidence for substitution of labor from one subsidiary to another. This can be explained by differences in the institutional settings specific to those studies. We also observe strong positive spillovers for affiliated subsidiaries which increase their employment.

Overall, our results highlight the reactions of companies as a result of tax avoidance opportunities. Furthermore, our results rationalize policies that decrease cor-

porate tax rates in order to attract businesses and jobs. However, our study cannot address whether this is welfare optimal. Future studies, should complement our work by trying to establish the long-term consequences of increased tax competition. While we are able to document an immediate reaction, we currently know very little about the long-term implications of tax avoidance on employment.

3.8 Tables and Figures

Figure 3.1: Control group 1

Picture (a) shows a treated parent and a treated Irish subsidiary. Picture (b) shows a treated parent from the same country with its two non-treated subsidiaries. Entities B and C in Picture (b) is a control subsidiary

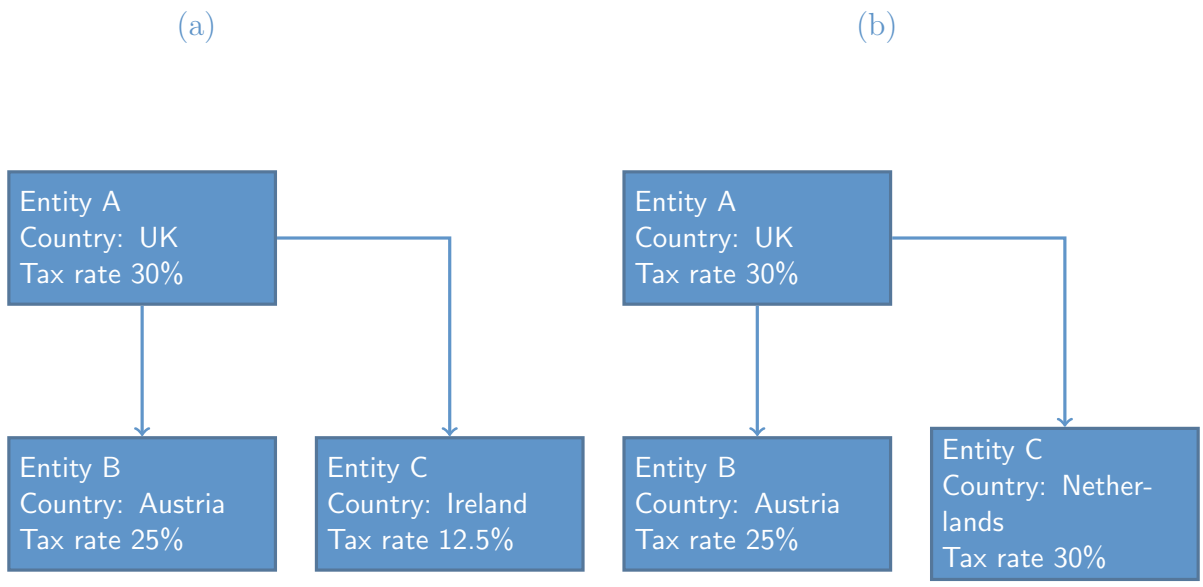


Figure 3.2: Control group 2

Picture (a) shows a treated parent and a treated Irish subsidiary. Picture (b) shows a non-treated parent from a different country with one low-tax and one regularly taxed subsidiary. Entity C in Picture (b) is a control subsidiary.

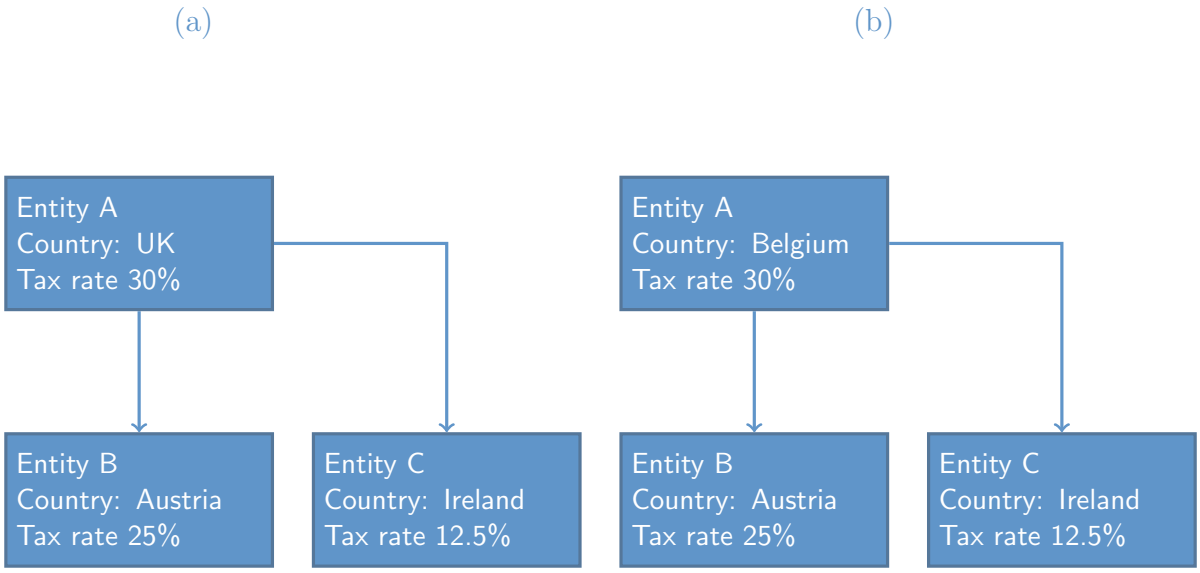


Figure 3.3: Common trend: Subsidiary labor costs

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.

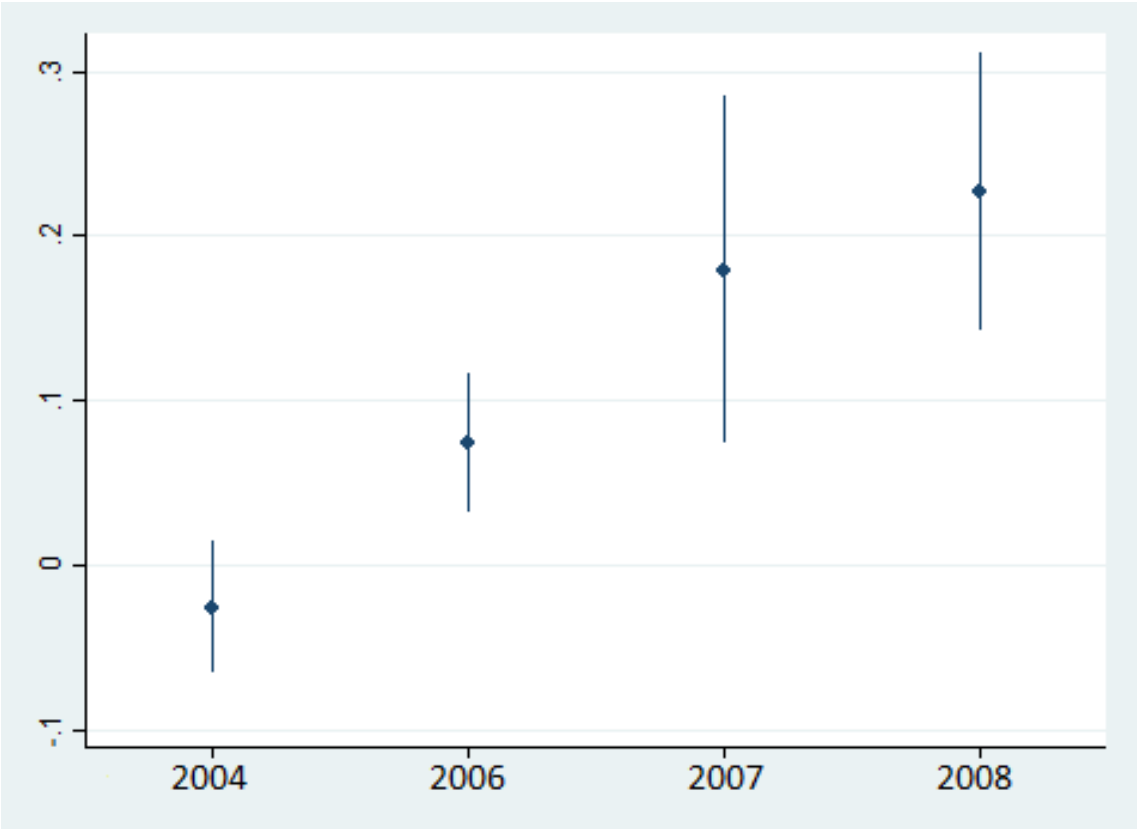


Figure 3.4: Common trend: Subsidiary number of employees

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.

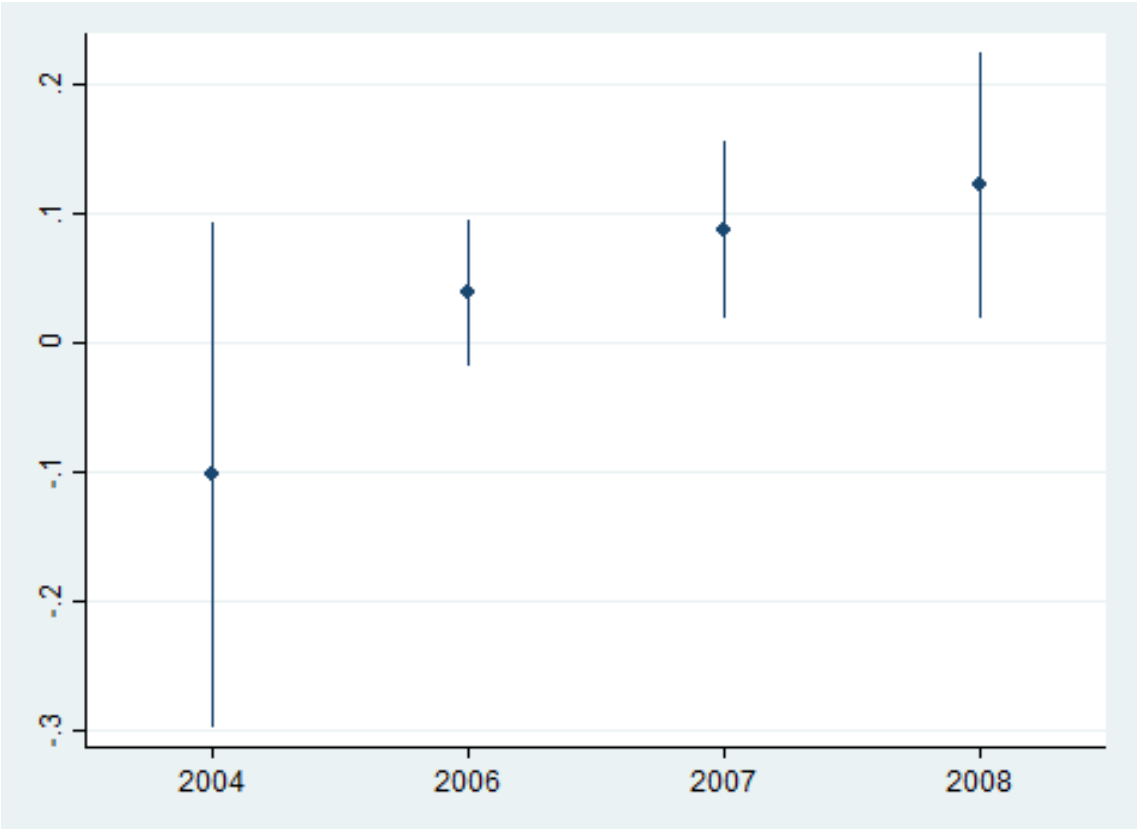


Table 3.1: Treated companies

Panel A provides an overview of the countries which had CFC rules in place at the time of the shock and what tax rates qualified as low-tax. Panel B provides the corporate tax rates in the year before the shock.

Panel A: CFC rules

Country with CFC rule	Low tax definition
Denmark	$\leq 23\%$
Germany	$\leq 27\%$
Norway	$\leq 19\%$
Portugal	$\leq 21\%$
Sweden	$\leq 15\%$
United Kingdom	$\leq 23\%$
Hungary	$\leq 10.67\%$

Panel B: Corporate Tax Rates

Country	Tax rate 2005
Austria	25%
Belgium	34%
Czech Republic	26%
Germany	41%
Denmark	30%
Estonia	24%
United Kingdom	30%
Greece	35%
Hungary	16%
Ireland	12.5%
Lithuania	15%
Luxembourg	30.7%
Latvia	15%
Netherlands	31.5%
Norway	28%
Poland	19%
Portugal	35%
Sweden	28%
Slovenia	25%
Slovakia	19%

Table 3.2: Subsidiary labor

This table shows the effects of the Cadbury Schweppes shock on labor costs and number of employees. Columns 1 and 4 use subsidiaries of parents not facing a CFC rule, but located in a low tax country as a control. Columns 2 and 5 use subsidiaries of parents facing a CFC rule, but not located in a low tax country as a control. Columns 3 and 6 use both control groups. Profitability is defined as Net profits over total assets. Depreciation is the depreciation cost scaled by sales. Tangibility is the tangible fixed assets over total assets and sales is the log of sales. Leverage is defined as interest bearing debt over total assets. Tax difference is the difference between the parent and subsidiary tax rate. *,**,*** indicate the 10%, 5% and 1% significance levels. Standard errors are clustered at the country-industry level.

	(1) Labour cost	(2) Labour cost	(3) Labour cost	(4) Number of employees	(5) Number of employees	(6) Number of employees
Treatment	0.030***	0.163***	0.126***	0.069***	0.057***	0.062***
	(0.011)	(0.037)	(0.012)	(0.015)	(0.017)	(0.012)
Subsidiary Tax Rate	-1.260***	-0.509	-0.235***	-0.766	0.608***	0.349***
	(0.454)	(0.401)	(0.065)	(0.543)	(0.130)	(0.063)
Tax rate difference	-0.312***	-0.165	-0.181***	-0.393***	0.203**	0.001
	(0.074)	(0.330)	(0.047)	(0.089)	(0.092)	(0.049)
Profitability	-0.279***	-0.240***	-0.245***	-0.199***	-0.183***	-0.185***
	(0.028)	(0.057)	(0.012)	(0.029)	(0.042)	(0.010)
Depreciation	0.000	0.003	0.003*	-0.001	0.002	0.001
	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Tangibility	0.193***	0.140***	0.159***	0.204***	0.174***	0.181***
	(0.038)	(0.029)	(0.017)	(0.046)	(0.019)	(0.018)
Sales	0.437***	0.477***	0.474***	0.327***	0.362***	0.355***
	(0.022)	(0.063)	(0.012)	(0.023)	(0.040)	(0.009)
Leverage	0.009	0.003	0.005	0.033**	0.001	0.002
	(0.012)	(0.003)	(0.004)	(0.015)	(0.005)	(0.004)
Subsidiary GDP growth	0.008***	-0.003	0.006***	0.013***	-0.001	0.000
	(0.002)	(0.005)	(0.002)	(0.003)	(0.005)	(0.001)
Subsidiary interest rate	0.006	0.031	0.012***	-0.020***	-0.020***	-0.011***
	(0.005)	(0.022)	(0.004)	(0.006)	(0.006)	(0.003)
Parent GDP growth	-0.015***	-0.009	-0.001	-0.017***	-0.004	-0.008***
	(0.003)	(0.006)	(0.001)	(0.003)	(0.005)	(0.001)
Parent interest rate	0.012**	0.017	0.005	0.009	-0.009**	0.002
	(0.005)	(0.018)	(0.003)	(0.006)	(0.003)	(0.003)
Labour tax	0.007***	-0.003	-0.006***	0.002	0.002	0.003***
	(0.002)	(0.004)	(0.000)	(0.002)	(0.001)	(0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,250	204,132	240,108	24,034	199,757	235,243
R-squared	0.986	0.983	0.984	0.980	0.984	0.984

Table 3.3: Subsidiary labor - by wage category

This table shows the effects of the Cadbury Schweppes shock on labor costs and number of employees. Columns 1 and 3 use an interaction with the domestic country being an above median wage country. Columns 2 and 4 use an interaction with the company being active in an above median wage industry. Controls are: Profitability defined as Net profits over total assets. Depreciation as the depreciation cost scaled by sales. Tangibility as the tangible fixed assets over total assets and sales is the log of sales. Leverage as defined as interest bearing debt over total assets. *,**,*** indicate the 10%, 5% and 1% significance levels. Standard errors are clustered at the country-industry level.

	(1) Labour cost	(2) Labour cost	(3) Number of employees	(4) Number of employees
Treatment	0.123***	0.160***	0.038***	0.042***
	(0.011)	(0.013)	(0.013)	(0.013)
Treatment interacted	0.207***		0.075**	
with high wage country	(0.030)		(0.032)	
Treatment interacted		0.036*		0.087**
with high wage industry		(0.022)		(0.034)
Year FE	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes
Observations	199,123	199,123	199,1238	199,123
R-squared	0.984	0.984	0.984	0.984

Table 3.4: Subsidiary investment

This table shows the effects of the Cadbury Schweppes shock on CAPEX and R&D. Columns 1 and 4 use subsidiaries of parents not facing a CFC rule, but located in a low tax country as a control. Columns 2 and 5 use subsidiaries of parents facing a CFC rule, but not located in a low tax country as a control. Columns 3 and 6 use both control groups. Profitability is defined as Net profits over total assets. Depreciation is the depreciation cost scaled by sales. Tangibility is the tangible fixed assets over total assets and sales is the log of sales. Leverage is defined as interest bearing debt over total assets. Tax difference is the difference between the parent and subsidiary tax rate. *,**,*** indicate the 10%, 5% and 1% significance levels. Standard errors are clustered at the country-industry level.

	(1) CAPEX	(2) CAPEX	(3) CAPEX	(4) R&D	(5) R&D	(6) R&D
Treatment	0.038	-0.151	-0.093	-0.007	0.173***	0.105
	(0.042)	(0.137)	(0.039)	(0.090)	(0.028)	(0.069)
Subsidiary Tax Rate	-8.451***	-0.614	-1.273***	5.480**	-2.166***	-1.455***
	(1.893)	(1.060)	(0.241)	(2.562)	(0.621)	(0.374)
Tax rate difference	0.326	0.378	-0.057	0.261	0.414***	0.016
	(0.384)	(0.390)	(0.209)	(0.622)	(0.141)	(0.338)
Profitability	0.126	-0.030	-0.051	-0.217	-0.210***	-0.235***
	(0.107)	(0.037)	(0.036)	(0.137)	(0.032)	(0.029)
Depreciation	0.002***	0.006**	0.007*	0.000	-0.001	0.000
	(0.001)	(0.003)	(0.004)	(0.001)	(0.002)	(0.003)
Tangibility	5.129***	5.656***	5.488***	0.309	-0.196**	-0.153***
	(0.193)	(0.476)	(0.116)	(0.203)	(0.077)	(0.054)
Sales	0.573***	0.497***	0.509***	0.293***	0.181***	0.202***
	(0.048)	(0.083)	(0.022)	(0.050)	(0.025)	(0.018)
Leverage	0.059	0.081***	0.084***	0.077	0.090***	0.090***
	(0.048)	(0.028)	(0.017)	(0.063)	(0.031)	(0.016)
Subsidiary GDP growth	-0.018*	0.025*	0.009*	0.024	0.017***	0.016***
	(0.010)	(0.014)	(0.005)	(0.015)	(0.005)	(0.006)
Subsidiary interest rate	0.124***	-0.006	0.011	-0.048	0.048*	0.011
	(0.025)	(0.062)	(0.012)	(0.037)	(0.024)	(0.015)
Parent GDP growth	-0.023*	0.012	-0.007	-0.013	0.018*	0.014**
	(0.012)	(0.014)	(0.006)	(0.015)	(0.009)	(0.007)
Parent interest rate	-0.013	-0.033	-0.006	0.025	0.006	0.002
	(0.021)	(0.026)	(0.013)	(0.029)	(0.011)	(0.017)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,812	166,270	196,529	11,604	139,408	157,937
R-squared	0.880	0.872	0.876	0.789	0.778	0.787

Table 3.5: Affiliated subsidiaries

This table shows the effects of the Cadbury Schweppes shock on labor costs and number of employees. The control group consists of subsidiaries with no affiliation to treated companies. Profitability is defined as Net profits over total assets. Depreciation is the depreciation cost scaled by sales. Tangibility is the tangible fixed assets over total assets and sales is the log of sales. Leverage is defined as interest bearing debt over total assets. Tax difference is the difference between the parent and subsidiary tax rate. *,**,*** indicate the 10%, 5% and 1% significance levels. Standard errors are clustered at the country-industry level.

	(1) Labour cost	(2) Number of employees
Treatment	0.125***	0.026**
	(0.009)	(0.010)
Tax rate difference	-0.258***	0.093
	(0.067)	(0.076)
Subsidiary tax rate	-0.568***	0.325**
	(0.135)	(0.158)
Profitability	-0.301***	-0.212***
	(0.027)	(0.028)
Depreciation	0.001	0.000
	(0.001)	(0.000)
Tangibility	0.266***	0.295***
	(0.037)	(0.046)
Sales	0.426***	0.334***
	(0.020)	(0.019)
Leverage	0.005	0.019
	(0.012)	(0.012)
Subsidiary GDP growth	-0.003***	-0.006***
	(0.001)	(0.002)
Subsidiary interest rate	0.006	-0.011***
	(0.004)	(0.004)
Parent GDP growth	-0.008***	-0.000
	(0.002)	(0.002)
Parent interest rate	0.007	-0.000
	(0.007)	(0.000)
Labor tax	-0.007***	0.000
	(0.000)	(0.000)
Year FE	Yes	Yes
Subsidiary FE	Yes	Yes
Observations	29,416	29,416
R-squared	0.984	0.985

Table 3.6: Affiliated subsidiary labor - additional tests

This table shows the effects of the Cadbury Schweppes shock on labor costs and number of employees. Columns 1 and 2 use an interaction with the domestic tax rate being in the lower tercile. Columns 3 and 4 use an interaction with the company being active in a country with an above average labor wedge. Columns 5 and 6 use an interaction for high wage countries. Controls are: Profitability defined as Net profits over total assets. Depreciation as the depreciation cost scaled by sales. Tangibility as the tangible fixed assets over total assets and sales is the log of sales. Leverage as defined as interest bearing debt over total assets. Tax difference is the difference between the parent and subsidiary tax rate. *,**,*** indicate the 10%, 5% and 1% significance levels. Standard errors are clustered at the country-industry level.

	(1) Labor cost	(2) Number of employees	(3) Labor cost	(4) Number of employees	(5) Labor cost	(6) Number of employees
Treatment	0.125***	0.039***	0.132***	0.031**	0.102***	0.013
	(0.011)	(0.013)	(0.011)	(0.013)	(0.011)	(0.014)
Treatment interacted	-0.048*	-0.047*				
with domestic tax	(0.025)	(0.029)				
Treatment interacted			-0.060***	-0.038*		
with labor wedge			(0.017)	(0.020)		
Treatment interacted					0.095***	0.041*
with high wage					(0.022)	(0.024)
Company controls	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Subsidiary FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,416	29,416	29,416	29,416	29,416	29,416
R-squared	0.987	0.981	0.986	0.981	0.986	0.981

Table 3.7: Entry of new subsidiaries

This table presents the results from a difference-in-difference regression using the Cadbury Schweppes case as treatment and first time entry into a country as a dependent variable. Column 1 shows the effect for low-tax countries, column 2 for other countries. Standard errors are clustered at the company level. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Incorporation rate low-tax countries	(2) Incorporation rate other countries
Treatment	0.035***	-0.002***
	(0.013)	(0.001)
Parent Tax Rate	0.114**	-0.015**
	(0.047)	(0.007)
Profitability	0.037***	-0.000
	(0.012)	(0.002)
Sales	-0.006**	0.000
	(0.002)	(0.000)
GDP growth	0.005***	-0.000
	(0.002)	(0.000)
Interest rate	-0.009	0.002**
	(0.005)	(0.001)
Year FE	Yes	Yes
Company FE	Yes	Yes
Observations	26,359	26,359
R-squared	0.375	0.446

Table 3.8: Robustness: Excluding UK parents

This table shows the effects of the Cadbury Schweppes shock on labor costs and number of employees. All companies with UK parents are excluded from the sample. The control group used is that of Table 3.2 and 3.4 columns 3 and 6. Profitability is defined as Net profits over total assets. Depreciation is the depreciation cost scaled by sales. Tangibility is the tangible fixed assets over total assets and sales is the log of sales. Leverage is defined as interest bearing debt over total assets. Tax difference is the difference between the parent and subsidiary tax rate. *,**,*** indicate the 10%, 5% and 1% significance levels. Standard errors are clustered at the country-industry level.

	(1) Labour cost	(2) Number of employees
Treatment	0.037***	0.068***
	(0.012)	(0.016)
Tax rate difference	-0.370***	-0.469***
	(0.079)	(0.093)
Subsidiary tax rate	-1.512***	-0.597
	(0.483)	(0.559)
Profitability	-0.293***	-0.218***
	(0.030)	(0.031)
Depreciation	0.011	0.001
	(0.013)	(0.016)
Tangibility	0.184***	0.199***
	(0.039)	(0.047)
Sales	0.440***	0.321***
	(0.022)	(0.023)
Leverage	0.003	0.043***
	(0.014)	(0.016)
Subsidiary GDP growth	0.008***	0.016***
	(0.002)	(0.003)
Subsidiary interest rate	0.009	-0.022***
	(0.005)	(0.006)
Parent GDP growth	-0.014***	-0.019***
	(0.003)	(0.004)
Parent interest rate	0.010**	0.012**
	(0.005)	(0.006)
Year FE	Yes	Yes
Subsidiary FE	Yes	Yes
Observations	23,163	23,163
R-squared	0.986	0.980

Table 3.9: Robustness: Excluding EU-27 expansion country parents

This table shows the effects of the Cadbury Schweppes shock on labor costs and number of employees. All companies with EU-27 expansion country parents are excluded from the sample. The control group used is that of Table 3.2 and 3.4 columns 3 and 6. Profitability is defined as Net profits over total assets. Depreciation is the depreciation cost scaled by sales. Tangibility is the tangible fixed assets over total assets and sales is the log of sales. Leverage is defined as interest bearing debt over total assets. Tax difference is the difference between the parent and subsidiary tax rate. *,**,*** indicate the 10%, 5% and 1% significance levels. Standard errors are clustered at the country-industry level.

	(1) Labour cost	(2) Number of employees
Treatment	0.148***	0.045***
	(0.012)	(0.012)
Tax rate difference	-0.416***	0.179***
	(0.050)	(0.045)
Subsidiary tax rate	-0.461***	0.537***
	(0.068)	(0.056)
Profitability	-0.244***	-0.185***
	(0.012)	(0.010)
Depreciation	0.003	0.002
	(0.002)	(0.002)
Tangibility	0.154***	0.184***
	(0.017)	(0.019)
Sales	0.472***	0.361***
	(0.013)	(0.010)
Leverage	0.004	0.002
	(0.004)	(0.004)
Subsidiary GDP growth	0.004**	0.002
	(0.002)	(0.001)
Subsidiary interest rate	0.020***	-0.014***
	(0.004)	(0.003)
Parent GDP growth	-0.007***	-0.003**
	(0.001)	(0.001)
Parent interest rate	0.023***	-0.010***
	(0.004)	(0.004)
Year FE	Yes	Yes
Subsidiary FE	Yes	Yes
Observations	222,602	222,602
R-squared	0.984	0.984

Table 3.10: Historical Corporate Tax Rates

This table presents regression results using a dummy for country level tax decreases as a dependent variable. Historical tax rates are collected from the OECD and the dummy variable takes a value of one whenever there was a decrease in corporate tax rates. We exclude all pre-planned tax decreases, i.e., cases where countries committed before hand to gradually decrease their tax rates over the following predefined set of years. Unemployment data comes from the International Labor Organization and is winsorized at the 1% and 99% level. Robust standard errors are reported in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10% statistical significance levels, respectively.

	(1) Dummy Tax Decrease	(2) Dummy Tax Decrease	(3) Dummy Tax Decrease
L1. Unemployment Growth	0.123	0.180*	0.183*
	(0.096)	(0.107)	(0.107)
L2. Unemployment Growth	0.033	0.034	0.036
	(0.129)	(0.130)	(0.131)
L. GDP Growth		0.008	0.006
		(0.010)	(0.009)
L. Government Expenditures			-0.010
			(0.009)
Year FE	Yes	Yes	Yes
Observations	603	603	603
Number of Countries	33	33	33

Figure 3.5: Common trend: Subsidiary CAPEX

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.

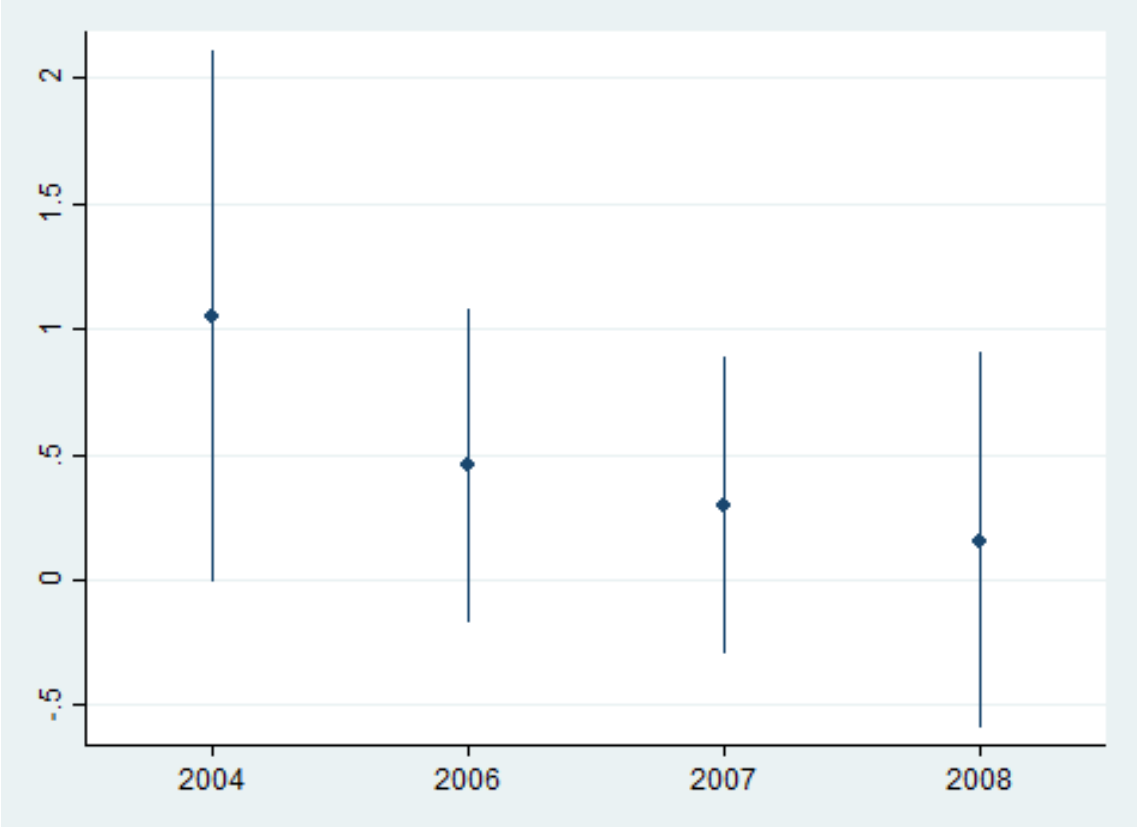


Figure 3.6: Common trend: Subsidiary R&D

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.

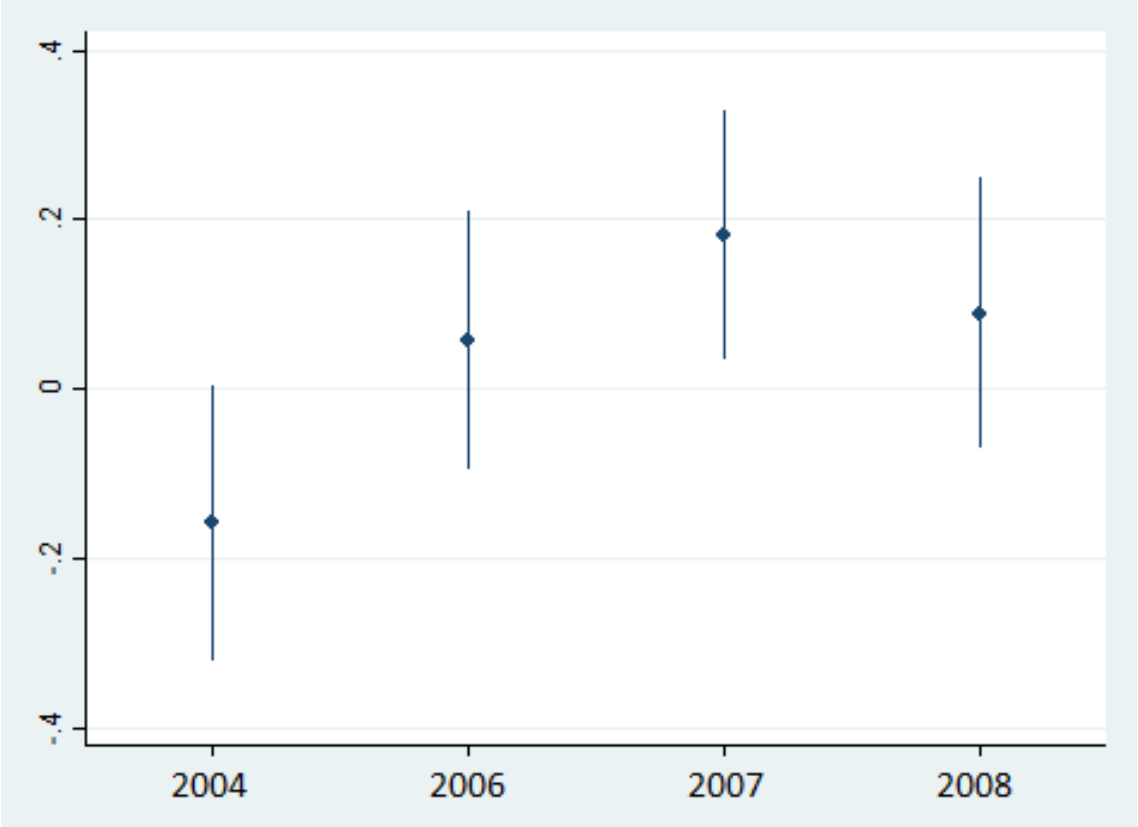


Figure 3.7: Common trend: Affiliated subsidiary labor costs

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.

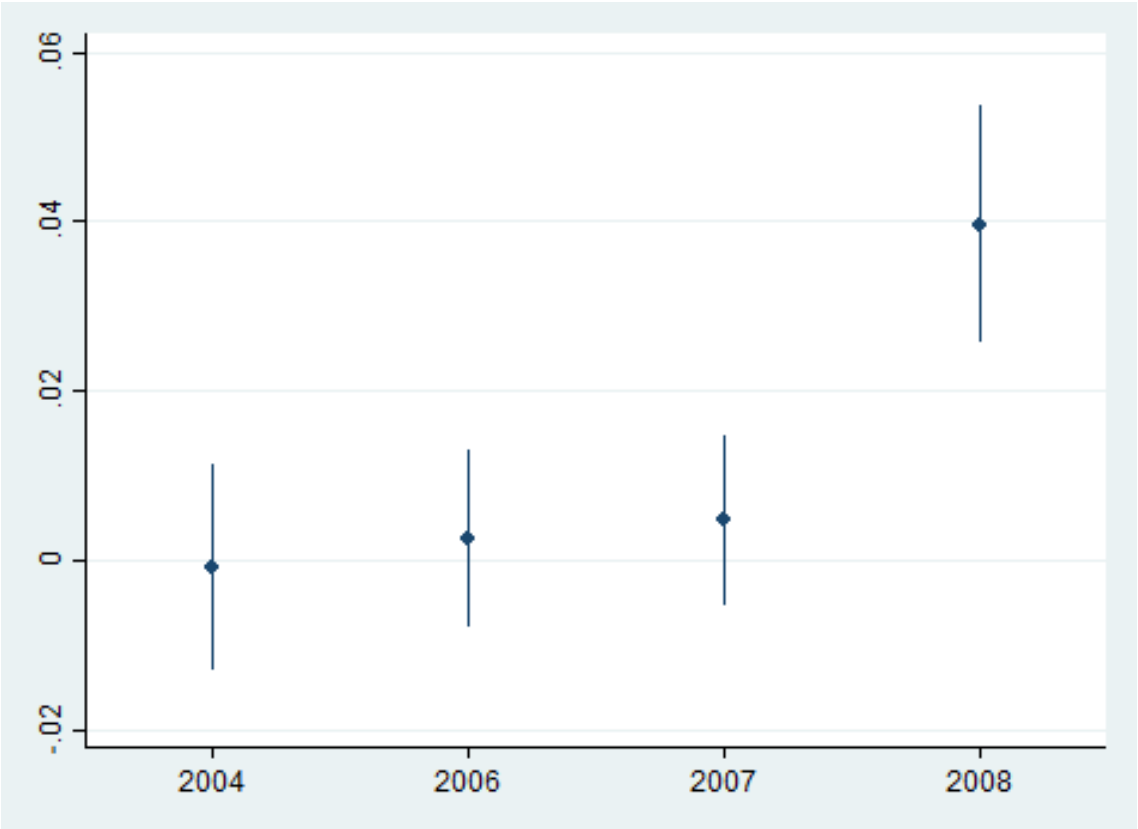


Figure 3.8: Common trend: Affiliated subsidiary number of employees

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.

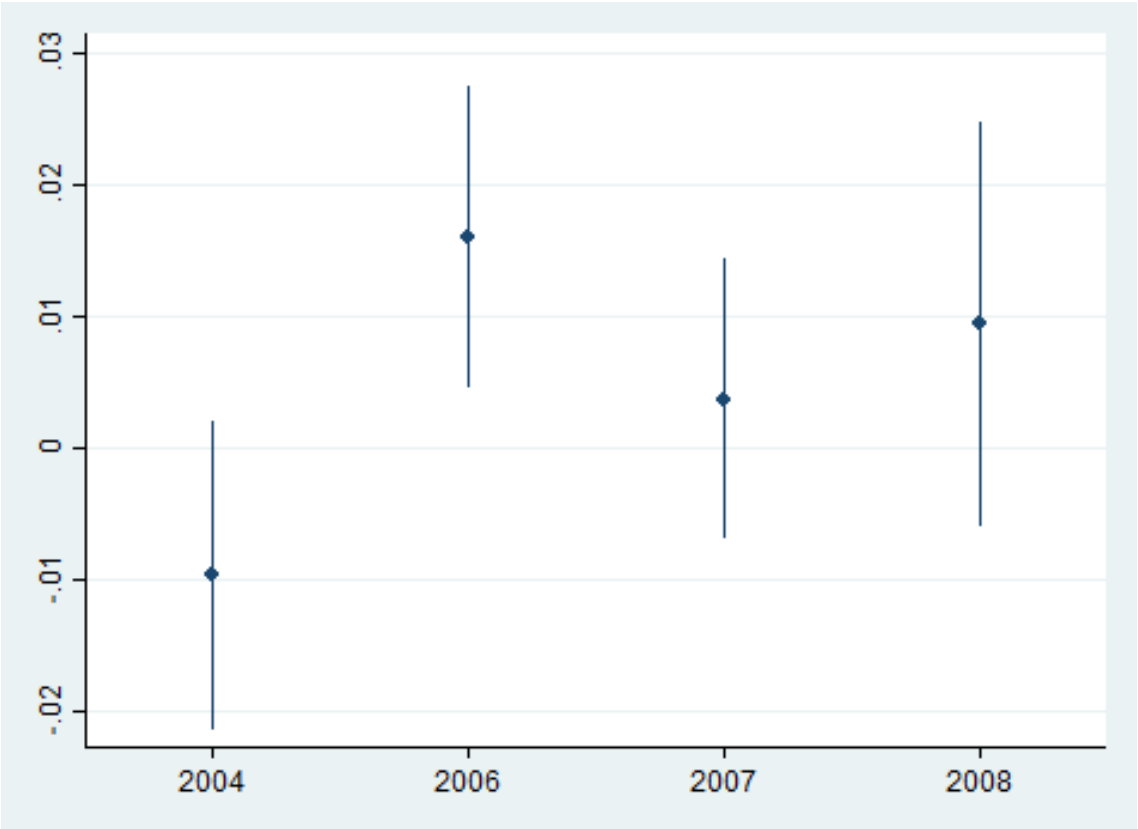
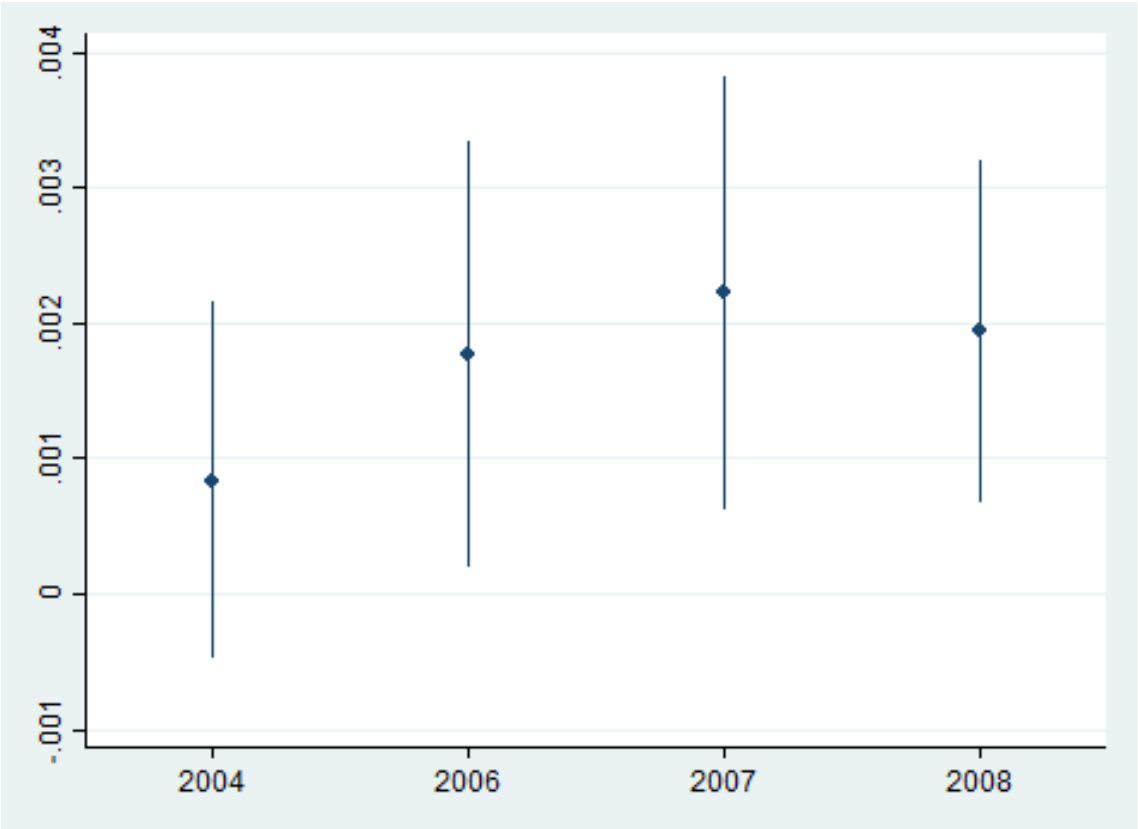


Figure 3.9: Common trend: entry of new subsidiaries

This graph shows the effect of being in the treated group for each year. 2005 is used as a baseline. For each estimate the 95% confidence interval is indicated. 2004 and 2005 are the years before the treatment, 2006-2008 are the treated years.



Bibliography

Almeida, Heitor, Murillo Campello, and Michael S Weisbach (2004) 'The cash flow sensitivity of cash.' *The Journal of Finance* 59(4), 1777–1804

Angrist, Joshua David, and Jörn-Steffen Pischke (2013) *Mostly Harmless Econometrics: an Empiricists Companion* (Cram101 Publishing)

Baker, Scott R., Nicholas Bloom, and Steven J. Davis (2016) 'Measuring economic policy uncertainty.' *The Quarterly Journal of Economics* 131(4), 1593–1636

Baldwin, Richard E., and Paul Krugman (2004) 'Agglomeration, integration and tax harmonisation.' *European Economic Review* 48, 1–23

Bank, Steven A. (2014)

Beck, Thorsten, Mikael Homanen, and Burak R. Uras (2018) 'Finance and demand for skill: Evidence from uganda.' *The Journal of Development Studies* pp. 1–18

Beck, Thorsten, Ross Levine, and Alexey Levkov (2010) 'Big bad banks? the winners and losers from bank deregulation in the united states.' *The Journal of Finance* 65(5), 1637–1667

Becker, Gary S. (1968) 'Crime and punishment: An economic approach.' *Journal of Political Economy* 76(2), 169–217

Benito, Andrew, and Ignacio Hernando (2007) 'Firm behaviour and financial pressure: evidence from spanish panel data.' *Bulletin of Economic Research* 59(4), 283–311

Benmelech, Efraim, Nittai K Bergman, and Amit Seru (2011) 'Financing labor'

Bennedsen, Morten, and Stefan Zeume (2017) 'Corporate tax havens and transparency.' *Quarterly Journal of Economics*

Bianco, Magda, and Giovanna Nicodano (2006) 'Pyramidal groups and debt.' *European Economic Review* 50(4), 937–961

Brok, Peter (2018) 'Corporate structure, international tax spillovers and capital structure.' *mimeo*

_ (2019) 'As uncertain as taxes.' *mimeo*

Brok, Peter, and Mikael Homanen (2019) 'Labour effects of tax avoidance.' *mimeo*

Buettner, Thiess, Michael Overesch, Ulrich Schreiber, and Georg Wamser (2012) 'The impact of thin-capitalization rules on the capital structure of multinational firms.' *Journal of Public Economics* 96(11), 930–938

Caggese, Andrea, and Vicente Cuñat (2008) 'Financing constraints and fixed-term employment contracts.' *The Economic Journal* 118(533), 2013–2046

Calfee, John E., and Richard Craswell (1984) 'Some effects of uncertainty on compliance with legal standards.' *Virginia Law Review* 70(5), 965–1003

Campenhoutvan Campenhout, Geert, and Tom van Caneghem (2013) 'How did the notional interest deduction affect belgian smes' capital structure?' *Small Business Economics* 40, 351–373

Chase-Dunn, Christopher, Yukio Kawano, and Benjamin D. Brewer (2000) 'Trade globalization since 1795: Waves of integration in the world-system.' *American Sociological Review* pp. 77–95

Chodorow-Reich, Gabriel (2013) 'The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis.' *The Quarterly Journal of Economics* 129(1), 1–59

Cingano, Federico, Francesco Manaresi, and Enrico Sette (2016) 'Does credit crunch investment down? new evidence on the real effects of the bank-lending channel.' *The Review of Financial Studies* 29(10), 2737–2773

Cobham, Alex, and Petr Janský (2017) 'Global distribution of revenue loss from tax avoidance.' *WIDER Working paper*

Code Général des Impôts (2005)

Cremers, Jan (2017) 'Developing an approach for tackling letterbox companies.' *Background paper for the European platform on tackling undeclared work seminar.*

Cristea, Anca D, and Daniel Nguyen (2016) 'Transfer pricing by multinational firms: New evidence from foreign firm ownerships.' *American Economic Journal: Economic Policy* 8(3), 170–202

Cullen, Julie Berry, and Roger Hall Gordon (2007) 'Taxes and entrepreneurial risk-taking: Theory and evidence for the us.' *Journal of Public Economics* 91(7), 1479–1505

d'Amato, Anthony (1983) 'Legal uncertainty.' *California Law Review*

Damgaard, Jannick, Thomas Elkjaer, and Niels Johannessen (2018) 'Piercing the veil'

Dari-Mattiacci, Giuseppe, and Bruno Deffains (2007) 'Uncertainty of law and the legal process.' *Journal of Institutional and Theoretical Economics* 163, 627–656

DeAngelo, Harry, and Ronald W. Masulis (1980) 'Optimal capital structure under corporate and personal taxation.' *Journal of Financial Economics* 8, 3–29

Desai, Mihir A., and Dhammika Dharmapala (2009) 'Corporate tax avoidance and firm value.' *The Review of Economics and Statistics* 91(3), 537–546

Desai, Mihir A., C. Fritz Foley, and James R. Hines (2004) 'A multinational perspective on capital structure choice and internal capital markets.' *Journal of Finance* 59, 2451–87

Desai, Mihir A, C Fritz Foley, and James R Hines (2006) 'The demand for tax haven operations.' *Journal of Public economics* 90(3), 513–531

Devereux, Michael P., and Rachel Griffith (1998) 'Taxes and the location of production: Evidence from a panel of us multinationals.' *Journal of Public Economics* 68(3), 335–367

Dharmapala, Dhammika (2014) 'What do we know about base erosion and profit shifting? a review of the empirical literature.' *CESifo Working Paper Series*

Dharmapala, Dhammika, and Nadine Riedel (2013) 'Earnings shocks and tax-motivated income-shifting: Evidence from european multinationals.' *Journal of Public Economics* 97, 95–107

Djankov, Simeon, Caralee McLiesh, and Andrei Shleifer (2007) 'Private credit in 129 countries.' *Journal of Financial Economics* 84(2), 299–329

Dyreng, Scott D., Michelle Hanlon, and Edward L. Maydew (2008) 'Long-run corporate tax avoidance.' *The Accounting Review* 83(1), 61–82

_ (2010) 'The effects of executives on corporate tax avoidance.' *The Accounting Review* 85(4), 1163–1189

Einkommensteuergesetz 1988 (2005) 'Bundesgesetz vom 7. juli 1988 über die besteuerung des einkommens natürlicher personen'

European Commission (2016) 'Commission proposes major corporate tax reform for the eu.' *European Commission, Strasbourg*

European Committee (2016) 'State aid: Ireland gave illegal tax benefits to apple worth up to 13 billion.' *IP/16/2923*

European Court of Justice (2006) 'Judgement from september 12'

Faccio, Mara, and Jin Xu (2015) 'Taxes and capital structure.' *Journal of Financial and Quantitative Analysis* 50(03), 277–300

Faccio, Mara, Maria-Teresa Marchica, and Roberto Mura (2011) 'Large shareholder diversification and corporate risk-taking.' *Review of Financial Studies* 24(11), 3601–3641

Faulkender, Michael W., and Jason M. Smith (2014) 'Taxes and leverage at multinational corporations.' *Journal of Financial Economics* 122(1), 1–20

Faulkender, Michael W, Kristine W Hankins, and Mitchell A Petersen (2019) 'Understanding the rise in corporate cash: Precautionary savings or foreign taxes.' *Review of Financial Studies*

Franklin, Benjamin (1819) 'The works of benjamin franklin.' *Volume XII, To M. Le Roy, Philadelphia, 13 November, 1789* p. 160

Garrett, Daniel G, and Juan Carlos Suárez Serrato (2019) 'How elastic is the demand for tax havens? evidence from the us possessions corporations tax credit.' *National Bureau of Economic Research*

Giroud, Xavier, and Joshua Rauh (2019) 'State taxation and the reallocation of business activity: Evidence from establishment-level data.' *Journal of Political Economy* 127(3), 000–000

Givati, Yehonatan (2009) 'Resolving legal uncertainty: the unfulfilled promise of advance tax rulings.' *Harvard John M. Olin Fellow's Discussion Paper Series No. 30; Harvard Law School Program on Risk Regulation Research Paper No. 09-3*

Graham, John R. (2000) 'How big are the tax benefits of debt?' *Journal of Finance* 55(5), 1901–1941

_ (2006) 'A review of taxes and corporate finance.' *Foundations and Trends in Finance* 1(7), 573–691

Graham, John R., and Alan L. Tucker (2006) 'Tax shelters and corporate debt policy.' *Journal of Financial Economics* 81(3), 563–594

Graham, John R., Michelle Hanlon, Terry Shevlin, and Nemit Shroff (2014) 'Incentives for tax planning and avoidance: Evidence from the field.' *The Accounting Review* 89(3), 991–1023

Gulen, Huseyin, and Mihai Ion (2016) 'Policy uncertainty and corporate investment.' *Review of Financial Studies* 29(3), 523–564

Gumpert, Anna, James R Hines Jr, and Monika Schnitzer (2016) 'Multinational firms and tax havens.' *Review of Economics and Statistics* 98(4), 713–727

Hadlock, Charles J., and Joshua R. Pierce (2010) 'New evidence on measuring financial constraints: Moving beyond the kz index.' *The Review of Financial Studies* 23(5), 1909–1940

Hart, Oliver, and John Moore (1988) 'Incomplete contracts and renegotiation.' *Econometrica: Journal of the Econometric Society* 56(4), 755–785

Hassett, Kevin A., and R. Glenn Hubbard (2002) 'Tax policy and business investment.' *Handbook of Public Economics, Volume 3*

Heider, Florian, and Alexander Ljungqvist (2015) 'As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes.' *Journal of Financial Economics* 118(3), 684–712

Hill, Matthew D., G. Wayne Kelly, G. Brandon Lockhart, and Robert A. Van Ness (2013) 'Determinants and effects of corporate lobbying.' *Financial Management* 42(4), 931–957

Hoppe, Thomas, Caren Sureth-Sloane, Deborah Schanz, and Susann Sturm (2017) '2016 global mnc tax complexity survey - executive summary'

Huizinga, Harry, and Luc Laeven (2008) 'International profit shifting within multinationals: A multi-country perspective.' *Journal of Public Economics* 92(5-6), 1164–1182

Huizinga, Harry P., Luc A.H. Laeven, and Gaetan Nicodeme (2008) 'Capital structure and international debt shifting.' *Journal of Financial Economics* 88(1), 80–118

Inkomstskattelag (2007) '1999:1229'

_ (2011) '1999:1229'

Jensen, Michael Cole, and William H. Meckling (1976) 'Theory of the firm: Managerial behavior, agency costs and ownership structure.' *Journal of Financial Economics* 3(4), 305–360

Kalemli-Ozcan, Sebnem, Bent Sorensen, Carolina Villegas-Sanchez, Vadym Volosovych, and Sevcan Yesiltas (2015) 'How to construct nationally representative firm level data from the orbis global database.' *NBER Working paper*

Kaplan, Steven N, and Luigi Zingales (1997) 'Do investment-cash flow sensitivities provide useful measures of financing constraints?' *The quarterly journal of economics* 112(1), 169–215

_ (2000) 'Investment-cash flow sensitivities are not valid measures of financing constraints.' *The Quarterly Journal of Economics* 115(2), 707–712

Kaplow, Louis (1995) 'A model of the optimal complexity of legal rules.' *Journal of Law, Economics, & Organization* 11(1), 150–163

_ (1999) Encyclopedia of Law and Economics.

Kawano, Laura, and Joel Slemrod (2012) 'The effect of tax rates and tax bases on corporate tax revenues: Estimates with new measures of the corporate tax base.' *NBER Working Paper*

Kestens, Katrien, Philippe Cauwenberge, and Johan Christiaens (2012) 'An investigation of the effect of the notional interest deduction on the capital structure of belgian smes.'

Klassen, Kenneth J., Petro Lisowksy, and Devan Mescall (2015) 'The role of auditors, non-auditors, and internal tax departments in corporate tax aggressiveness.' *The Accounting Review* (91(1)), 179–205

Klassen, Kenneth J., Petro Lisowksy, and Devan Mescall (2017) 'Transfer pricing: Strategies, practices, and tax minimization.' *Contemporary Accounting Research* 34(1), 455–493

Kolasinski, Adam C. (2009) 'Subsidiary debt, capital structure and internal capital markets.' *Journal of Financial Economics* 94, 327–343

Kraus, Alan, and Robert H. Litzenberger (1973) 'A state-preference model of optimal financial leverage.' *Journal of Finance* 28(4), 911–922

La Porta, Rafael, Florencio Lopez de Silanes, Andrei Shleifer, and Robert Vishny (1997) 'Legal determinants of external finance.' *Journal of Finance* 52, 1131–1150

Laki elinkeinotulon verottamisesta (2009) '24.6.1968/360'

Lewellen, Wilbur G. (1970) 'A pure financial rational for the conglomerate merger.' *Journal of Finance* 26(2), 521–537

Ley del Impuesto sobre Sociedades (2005) 'Real decreto legislativo 4/2004'

Li, Shaojin, Toni M. Whited, and Yufeng Wu (2016) 'Collateral, taxes, and leverage.' *Review of Financial Studies* 29(6), 1453–1500

Ljungqvist, Alexander, and Michael Smolyansky (2018) 'To cut or not to cut? on the impact of corporate taxes on employment and income.' *NBER Working Paper Series*

Luciano, Elisa, and Giovanna Nicodano (2014) 'Guarentees, leverage, and taxes.' *Review of Financial Studies* 88(1), 80–118

Mertens, Karel, and Morten O. Ravn (2013) 'The dynamic effects of personal and corporate income tax changes in the united states.' *American Economic Review* (103), 1212–1247

Miller, Merton H. (1977) 'Debt and taxes.' *Journal of Finance* 32(2), 261–275

Modigliani, Franco, and Merton H. Miller (1958) 'The cost of capital, corporation finance and the theory of investment.' *American Economic Review* 48, 261–297

_ (1963) 'Corporate income taxes and the cost of capital: A correction.' *American Economic Review* 53, 433–443

Neretina, Ekaterina (2018) 'Lobbying externalities and competition.' *mimeo*

New York State Bar Association (2002) 'Report on outbound inversion transactions'

Nicodano, Giovanna, and Luca Regis (2018) 'A trade-off theory of ownership and capital structure.' *Journal of Financial Economics*

OECD (2014) 'Limiting base erosion involving interest deductions and other financial payments, action 4 - 2015 final report'

Overesch, Michael, Sabine Schenkelberg, and Georg Wamser (2018) 'Do us firms pay less tax than their european peers? on firm characteristics, profit shifting opportunities, and tax legislation as determinants of tax differentials'

Pagano, Marco, and Giovanni Pica (2012) 'Finance and employment.' *Economic Policy* 27(69), 5–55

Panier, Frederic, Francisco Pérez-González, and Pablo Villanueva (2012) 'Capital structure and taxes: What happens when you (also) subsidize equity?' *University of Stanford*

Pistor, Katharina, and Chenggang Xu (2002) 'Law enforcement under incomplete law: Theory and evidence from financial market regulation.' *Columbia Law and Economic Working Paper*

_ (2003) 'Incomplete law-a conceptual and analytical framework and its application to the evolution of financial market regulation.' *Journal of International Law and Politics* 35(4), 931–1013

Podatek dochodowy od osób prawnych (2009) 'Ustawa z dnia 15.02.1992 r. o podatku dochodowym od osób prawnych'

Polinsky, A. Mitchell, and Steven Shavell (1979) 'The optimal tradeoff between the probability and magnitude of fines.' *The American Economic Review* 69(5), 880–891

Popov, Alexander (2014) 'Credit constraints and investment in human capital: Training evidence from transition economies.' *Journal of Financial Intermediation* 23(1), 76–100

Popov, Alexander A, and Jörg Rocholl (2017) 'Financing constraints, employment, and labor compensation: evidence from the subprime mortgage crisis'

Rajan, Raghuram G.,, and Luigi Zingales (1995) 'What do we know about capital structure? some evidence from international data.' *Journal of Finance* 50, 1421–1460

Rodano, Giacomo, Nicolas Serrano-Velarde, and Emanuele Tarantino (2016) 'Bankruptcy law and bank financing.' *Journal of Financial Economics* 120(2), 363–382

Ruf, Martin, and Alfons J Weichenrieder (2013) 'Cfc legislation, passive assets and the impact of the ecj's cadbury-schweppes decision.' *WU International Taxation Research Paper Series*

Safavian, Mehnaz, and Siddharth Sharma (2007) 'When do creditor rights work?' *Journal of Comparative Economics* 35(3), 484–508

Schenkelberg, Sabine (2018) 'The cadbury schweppes judgment and its implications on profit shifting activities within europe.' *mimeo*

Scheuer, Florian (2013a) 'Adverse selection in credit markets and regressive profit taxation.' *Journal of Economic Theory* 148(4), 1333–1360

_ (2013b) 'Optimal asset taxes in financial markets with aggregate uncertainty.' *Review of Economic Dynamics* 16(3), 405–420

Serfling, Matthew (2016) 'Firing costs and capital structure decisions.' *The Journal of Finance* 71(5), 2239–2286

Shevlin, Terry J., Niklas Lampenius, and Arthur Stenzel (2019) 'Corporate tax-rate and tax-base avoidance trends of us domestic and us multinational firms.' *SSRN working paper*

Simintzi, Elena, Vikrant Vig, and Paolo Volpin (2014) 'Labor protection and leverage.' *The Review of Financial Studies* 28(2), 561–591

Suárez Serrato, Juan Carlos (2018) 'Unintended consequences of eliminating tax havens.' *National Bureau of Economic Research*

Tax Cuts and Jobs Act (2017)

Tørsløv, Thomas R, Ludvig S Wier, and Gabriel Zucman (2018) 'The missing profits of nations.' *National Bureau of Economic Research*

Wallerstein, Immanuel (1976) 'Semi-peripheral countries and the contemporary world crisis.' *Theory and Society* 3(4), 461–483

Weichenrieder, Alfons (1996) 'Fighting international tax avoidance: The case of germany.' *Fiscal Studies* 17(1), 37–58

Wet op de inkomstenbelasting 2001 (2005)

Wet op de Vennootschapsbelasting 1969 (2005)

White House, and U.S. Treasury (2012) 'The president's framework for business tax reform.' *White House and U.S. Department of the Treasury, Washington, D.C.*

Zangari, Ernesto, Antonella Caiumi, and Thomas Hemmelgarn (2017) 'Tax uncertainty: Economic evidence and policy responses.' *European Commission Working Paper*

Zucman, Gabriel (2014) 'Taxing across borders: Tracking personal wealth and corporate profits.' *The Journal of Economic Perspectives* 28(4), 121–148

Zákon České národní rady o daních z příjmů (2005) 'Zákon č. 586/1992 sb.' ΩÖner

Öner, Cihat (2018) 'Is tax avoidance the theory of everything in tax law? a terminological analysis of eu legislation and case law.' *EC Tax Review* 27(2), 96–112